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AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 4 JULY, 1921 No. 7

RESTORATION OF OBLITERATED EYE SOCKET.

JOHN M. WHEELER, M. D.

NEW YORK CITY.

The forming of a socket to hold an artificial eye by implanting a dermic graft pressed into the walls of the cavity on an appropriate form had been tried before; but reached its highest development thru work growing out of the great war. The writer's technic as here set forth shows the best development of this method. Read before the First Annual Session, Ohio Section, Clinical Congress, American College of Surgeons, Cleveland, April 1, 1921.

Loss of conjunctiva which results in obliteration of the eye socket is caused most commonly by burns, as by molten metal, acids and lime. Less frequently, it is occasioned by traumatism or by improperly performed enucleation of the eyeball. Recently many war wound cases have been operated on for socket obliteration. In dealing with the condition, the cause is of little consequence. The obliteration may be partial or complete, and restoration in all degrees of contraction has been considered a difficult task. The importance of the procedure cannot be doubted, for appearance of the individual, whether woman or man, counts for much. One cannot help being surprised at the insistence of the desire on the part of patients of all classes to wear protheses after loss of eyes. Commonly a patient will submit to operation after operation for restoration of lost cul de sacs, in order to be able to carry an artificial eye.

In discussing the important subject, let me first refer to some of the methods that have been used or advocated, and then describe a method which I have evolved out of a considerable experience and adopted as the most satisfactory. Just how much is original and just where priority belongs is not of especial interest. The important thing is that by the method which I shall describe, one can permanently restore obliterated eye sockets, without adding any new deformity, and without too tedious an ordeal for either patient or surgeon. The method can be given with confidence because numerous results justify it.

The well known method of Weeks[1], which calls for a large dermic graft from the inner surface of the arm for each cul de sac, enables the surgeon to give the patient a socket capable of carrying an artificial eye, providing the rather difficult technic is properly carried out. But considerable shrinkage occurs, with accompanying entropion, and many surgeons who have tried the method have been disappointed by almost complete loss of the new socket thru undue contraction. The procedure is tedious, especially as only the upper or lower cul de sac is made at an operation; and, if both upper and lower have to be restored, a period of weeks or months must pass between operations. Moreover, a successful result by the Weeks method is open to the criticisms applicable to all sockets made by the use of true skin—namely, that the tissue is too thick for an ideal lining, that the secretions of the glands of the dermis tend to make the socket foul, unless the patient is more than ordinarily intelligent and faithful in the care of the socket, and that after transplantation, the skin furnishes hairs which may grow to a surprising length if they are not epilated faithfully. Then, too, there is always the possibility that the arm wound will open up, and that there will be delayed healing.

Many surgeons have used in different ways small epidermic grafts, us-

ually with disappointing results. Recently in war wound work, Gillies[2] and others have employed the Esser method[3] and modifications of this method. The essence of the Esser procedure is the burial of epidermic grafts (raw surface outward) on a form, which later is cut down upon and released thru the palpebral fissure after the graft has taken. The important point in the method is to get firm contact between the raw surface of the prepared area and the raw surface of graft. The point is a good one, but certainly there is no necessity for employing such technic in order to get firm contact, and the method is too crude and inexact.

In 1893, Maxwell[4], in an article entitled "An Operation for the Relief of Symblepharon, or to Enlarge a Contracted Socket so that it may hold a Glass Eye," described a procedure for carrying a flap of skin from the lower eyelid thru the lid substance, and using this skin flap for a lower cul de sac. In 1903, he published a modification of his operation[5]. In 1918, Schwenk and Posey[6] advocated the use of the Maxwell operation for restoration of the lower cul de sac, altho they said that the lid "evinces a tendency to ectropion" following it. They also recommended the use of a pedunculated flap from the forehead for restoration of the upper cul de sac. Sockets formed by such methods are far from ideal and, manifestly, outward deformities must follow their use. An oculist who recently has been resorting to the Maxwell operation writes me, "I regret to say that my personal experience with the Maxwell operation is sufficient to prove to me that it is not practical."

Morax[7] in an admirable treatise on "Plastic Operations on the Orbital Region" treats the subject of socket restoration in an interesting way. He advocates the use of cutaneous pedicled flaps from the upper eyelid and temple for partial symblepharon and of dermo-epidermic grafts for extensive grafting. He also suggests the combination of the two for total obliteration. In using the detached grafts, Morax employs an elaborate technic, operating in stages. First, he makes his dissection, including free canthotomy, and exposes the area to be grafted upon by attaching the upper lid margin to a raw surface just under the brow made by an incision, and by attaching the lower lid margin to a similarly made raw surface in the cheek. He then covers the raw surfaces of the eyelids and fundus of the cavity with dermo-epidermic grafts taken from the arm. About a fortnight later, he liberates the lid margins from the brow and cheek, and brings the lid margins together to adhere over a mould of lead or paraffin. Four to six weeks later, he opens the cavity and puts in an artificial eye. In combination with this method, sometimes he turns in a pedicled flap from the temporal region. In doing all this Morax has made a complex matter out of a relatively simple one, and has unnecessarily lowered his chances of getting a complete take by creating an uneven grafting surface with areas of decidingly varying degrees of resistance to pressure, and so with varying chances of good contact between raw surfaces.

The critical comments which I have made on ingenious schemes and on methods, in some ways admirable, employed by other surgeons are not offered in condemnation, but merely to give reasons for my seeking a technic which will give more nearly ideal results and which will have an appeal for general adoption for restoration of the socket.

THE AUTHOR'S TECHNIC.

Let us assume a case of complete obliteration of the eye socket.

Before grafting for restoration, the surgeon should be sure that there are no pus forming areas in the region. In war wound cases, purulent dacryocystitis and pus pockets from foreign bodies are not rare, and in such cases, excision of the diseased lacrimal sacs or other pus sacs is of importance as a preliminary step. Eyelid deformities may be present and preliminary plastic procedures may be necessary for their repair. I have in mind such injuries as partial or complete loss of hair line

at the lid margin, lid lacerations, and also deformities due to unsuccessful attempts at repair of the cul de sacs, particularly by attached flap methods. In all such cases, the lid restoration should be completed before that of the socket is undertaken.

Anesthesia.—General anesthesia is administered, preferably thru a tube, as the surgeon should not be hampered by an ether cone or any form of inhaler which would encroach on the operative field. I have restored the lower cul de sacs under novocain infiltration anesthesia, but have never attempted complete restoration with any form of local anesthesia. I believe, however, that it might be feasible to perform complete restoration under local anesthesia in some cases. The entire procedure should not require more than an hour to an hour and one-half.

Instruments, etc.—Small scalpel, mouse tooth forceps, multiple tooth forceps, anatomic forceps for sponging, straight and curved scissors, lid everter (such as Ehrhardt's), three or four fine artery forceps, lid retractors and strabismus hooks, skin graft razors, a teasing needle, dental impression compound. A needle holder and 00 or 000 plain gut ligatures may be used in the preparation of the orbital bed.

Preparation of Patients.—Robust physical condition is desirable for a complete "take" of the graft and for prompt healing with a minimum of granulation tissue formation under the graft. Any constitutional ailment should be combatted, and the physical condition of the patient should be built up. For several days in advance, the field of operation should be kept clean by boric acid bathing and if there is any blepharitis, this should be corrected by a suitable ointment (yellow oxid 1%, or bichlorid 1-3000) and massage. If the operator chooses, the thigh area from which the graft is to be taken may be prepared in advance by shaving, rubbing with alcohol and ether or with benzene or gasoline, and applying a sterile dressing. Usually I do not give the skin area any advance preparation, and after the patient is under anesthesia, have it shaved and thoroly rubbed with gauze soaked in alcohol and ether, and then cleansed off with sterile salt solution. I have used tinctur of iodin on the skin, but its use is not necessary and I have abandoned it. The lids and any remains of conjunctiva should be wiped free of any secretions, and tinctur of iodin should be applied thoroly to the entire operative field.

Preparation of Bed to Receive Graft.—An incision is made to separate the lid margins if they are adherent, and then the dissection is carried in such a way as to separate the lids from the orbital contents. A free canthotomy is made extending from the outer canthus to the outer orbital margin. The idea in making such an extensive canthotomy is to enable the surgeon to introduce a large form so that the whole socket may be restored at one operation. If only the upper or the lower cul de sac has to be restored, a short canthal incision is sufficient and in some cases, none at all is needed. In lifting the eyelids from the orbital contents and making the socket which is to be lined with skin, several important points should be borne in mind.

First. *Plane of Dissection.* The dissection must be kept superficial, so that in front of the dissecting knife or scissors, there is only lid tissue—that is only skin, orbicularis and the thin fascia of the lid, and tarsus. It is not even necessary to save the tarso-orbital fascia with the lid. Probably one of the most common causes of failure is for the surgeon to carry the dissection back into the orbital tissue. The sense of touch helps out in this part of the operation. By external palpation, the scissors can be felt thru the thin lid and can be kept working accurately. After cutting the eyelids from the underlying tissues, I evert them with the Ehrhardt lid everter and carefully trim away anything adhering to the thin layer of fascia which lines the orbicularis. This leaves a thin but well vascularized lid layer with a smooth and favorable area to receive the lining graft of epidermis.

Second. *Extent of Dissection.* Not only the superficial plane of the dissection, but the extent and limitations of the dissection are important. Temporally and below, it should be carried well

to the orbital margin and even 1 mm. or 2 mm. beyond, as we wish the graft to adhere to the periosteum of the anterior aspect of the orbital margin. On the nasal side, the dissection should be to the anterior crest of the lacrimal groove and to the orbital margin above it. A point of caution is in order here. The internal canthal ligament holds the lids at and near the canthus so unyieldingly in position that, in attempting to carry the superficial dissection behind them, there is danger of cutting thru one or both of the lids near the canthus. Both vision and palpation should be employed to avoid this accident. Should it happen, the wound can be closed by skin sutures, after the graft has been placed. A point of refinement in dissecting at the inner canthus is to save the caruncle if it has not already been destroyed. The graft will adhere to the posterior surface of the caruncle and give it a permanent lining. Temporally and below, the division of tissues is made to the orbital margin, and nasally, to the lacrimal crest; but in the division of the tissues above, the dissection is carried behind the orbital rim and not necessarily to the roof of the orbit. It is not always necessary to destroy the levator palpebræ. If the grafted skin is attached to the periosteum below and laterally, it is sufficiently anchored, and slung across from the nasal to temporal margin, as it were. It is not necessary to have a deep cul de sac above. It is important that it be deep below, so that no support for the prothesis will have to come from the lower lid. At the sides, the socket should extend well beyond the canthi, for if any part of the edge of the artificial eye shows, the appearance of a globe is gone, and with it the illusion.

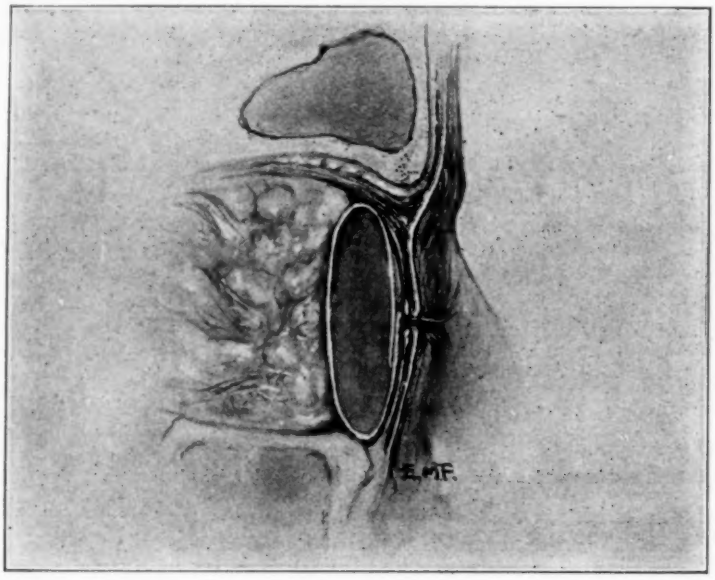

Fig. 1.—Vertical antero-posterior cross section thru orbit and eyelids to show dissected cavity between the eyelids and orbital contents for a new socket.

Third. In preparing the bed for the graft, *all cicatricial and granulation tissue should be removed.* Excision of granulation tissue is especially urgent, as its contraction may result in contraction of the socket. Many sockets have suffered on account of failure in this regard. Reduction in size of the newly made socket is not due to contraction of the skin itself, but to that of underlying tissue.

Fourth. *Thinning and Trimming of Tarsus.* A common fault that manifests itself after restoration of the socket is that of too much thickness of the lid margin. If to the outside skin, orbicularis and tarsus are added the skin graft and the inevitable thin layer of connec-

tive tissue underlying the graft, the lid at the margin is bound to be too thick and it will stand out as a cosmetic blemish. This deformity can be obviated by cutting away tarsus. If the skin graft must extend completely to the margin of the eyelid, the tarsus can be split and thinned. If the graft is to extend nearly to the margin, enough tarsal plate can

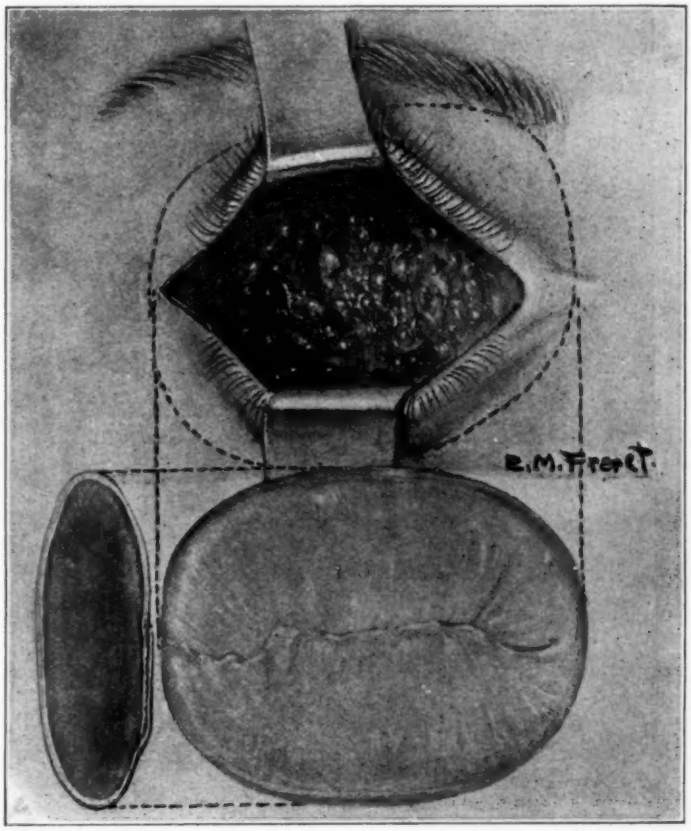

Fig. 2.—Dissection completed. Eyelids retracted to show bed for reception of graft. Orbital margin indicated by curved dotted line.

Below—Cross section and front view of form, completely covered by epidermic graft ready for introduction into the prepared cavity.

be cut away so that the graft will set in as an inlay. In any case, enough tarsus should be left to support the cilia, but not necessarily any more. For a finished result this fourth point is essential.

In all this preparation of the socket for the reception of the graft, no undue traumatism is to be offered. Spurting vessels can be caught up with fine artery clamps, but no ties should be applied. The tissues should not be lacerated in any way. I avoid using a tissue forceps in carrying on the preparatory dissection—merely a knife and a sturdy thin-bladed scissors curved on the flat, and carry out the process in as clean-cut a manner as possible, giving a minimum amount of trauma in order to leave the vitality of the tissues at as high a pitch as possible. If there is a cleft anywhere in the fundus of the socket due to the removal of scar tissue, it may be closed by the use of buried fine cat gut ligatures. On no account should suture material be exposed so as to come in contact with the graft after it has been introduced. During the dissection, there is bound to be considerable bleeding and the assistant can be of great help by skillful sponging

with gauze strips and anatomic forceps, using firm pressure in the act, but not rubbing the exposed tissues.

Removal of any tags, free or attached, and irrigation with lukewarm normal salt solution or boric acid complete the preparation. No hot solution or strong antiseptic should be used, for fear of lowering the vitality of the tissue cells. After the cavity is ready, do not pack it. Simply put a damp pad over the lids and apply pressure if there is any oozing.

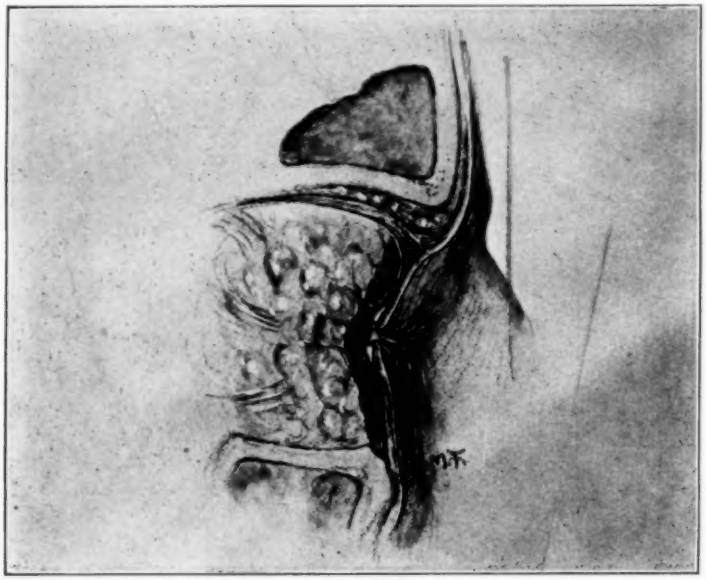

Fig. 3.—Vertical cross section showing epidermis-covered form placed for lining of new socket.

The Form to hold the Epidermic Graft. A form is now moulded to fit the cavity. Dental impression compound is ideal for the purpose. (I have found "Kerr's Perfection Impression Compound" satisfactory. It can be obtained from any dental supply house.) Sterilization of the compound can be accomplished by baking it, or by putting it in a porcelain dish and placing the dish in boiling water, there to remain for 15 or 20 minutes. The moulding process is best accomplished by holding the plastic compound in warm water and working it into the desired size and shape with the fingers. Ordinarily for full restoration of the socket, the dimensions are approximately as follows—length 40 to 45 mm., width 30 mm., thickness 4 or 5 mm. The entire surface of the form should be smooth and free from cracks. After the moulding process is finished, drop it in cool or cold water or salt solution to "set" it. If you do not get it right in size and shape, you can put it back into the hot water again and make corrections and then "set" it again in cool water and leave on a towel or tray until the graft is ready.

Taking the Skin Graft. The ideal graft for socket restoration is one without perforations, and made up of epidermis only, free from layers of true skin, and large enough to be wrapped around the form of impression compound with generous overlapping. This means a graft 3 to 3½ inches long and 2½ to 3 inches wide. I am not content with patches or scraps of skin for this purpose, and I do not allow myself the liberty of cutting into the dermis, altho to do so is much easier than not. To carry true skin along with the graft means delayed healing and scarring of the area from which the skin is taken, and it means a less tractable graft for wrapping nicely about the form. It also means undesirable and unnecessary thickness of the socket lin-

ing, with decreased pliability, and, moreover, the possibility of oily secretion which becomes rancid, and hairs which have to be pulled. I say this with the knowledge that Morax and others recommend dermo-epidermic grafts for the purpose.

The razor should have a larger blade than is usual for a shaving razor. Otherwise the design is unimportant. The Dench model is satisfactory. But the cutting edge must be keen to a fault thruout its entire length. I have gotten better razor edges from barbers who would take an interest than from instrument makers. It is well to have at least two razors so that if one is found faulty, you can have another chance.

The outer aspect of the upper part of the thigh is the best place from which to get a large epidermic graft. This is shaved, cleansed and draped. Then a very little sterile vaselin is rubbed on the skin, so that the razor blade will not stick to the skin at the edges of the graft as it is being taken. An assistant, with a towel or gauze over the skin to prevent slipping, by using the edge of his hand, holds the thigh skin taut and flattens out the surface. The operator with one hand controls the skin surface, and with the other carefully shaves off the single large graft of epidermis (2½ to 3 inches by 3 to 3½ inches), taking care not to perforate and not to go too deep. With the hand, the skin surface can be so controlled that it can be depressed or elevated at different points as the need may be.

The graft of epidermis is immediately wrapped about the form of impression compound, raw surface outward and overlapped on the surface which is to be anterior. If the graft has no true skin, and if there is the slightest amount of vaseline on either the skin or the impression compound, it will cling closely to the form. In placing the graft on the form, I should use only the fingers and a fine teasing needle, and not grasp it with a forceps. The form, completely covered with epidermis, is forced into the socket cavity; and it is not necessary to remove small blood clots before placing it, as they will not prevent a "take." The overlapping portion of the graft is placed forward; so that if thru manipulation the edges are disturbed, they can be carefully replaced thru the palpebral fissure, in such a way that every part of the form will be covered. No sutures are used. Formerly I stitched together the lid margins, but found that nothing was gained by this step, so abandoned it.

Dressing and Aftercare. In placing the gauze, it is well to put strips both above and below the palpebral fissure so as to make sure by control of the pressure that the edges of the lids are not turned in. Then gauze fluff is packed on, and a gauze patch is put over this, and adhesive strips are used to make firm pressure. A *pressure* bandage is applied, and over this adhesive strips again. Very firm pressure is important, to secure accurate contact at all points and to keep the cavity absolutely obliterated. This first pressure dressing is left in place for a week. When removed, it is bound to be soaked with blood and secretions, and and there is an odor from the sloughing of the overlapped skin graft. But if pressure has been sufficient, very little reaction of the tissues will manifest itself. I should not even separate the lid margins at the first dressing, but merely bathe off the lids carefully with cotton sponges damp with boric acid solution.

After the first dressing has been removed, extreme pressure is not necessary, but the dressings should be snug. They may be changed every day or every other day as comfort may dictate. Irrigation is not necessary and disturbance of the form is to be avoided. This is to be left alone for three weeks or approximately that, and then it should be removed and not inserted again. The operator may choose to give the patient a whiff of gas for the removal of the form, as the tissues are rather tender by the end of a 3 weeks period. Usually I employ cocain instillation for anesthesia. The form can be caught by a hook and usually can be carried out of the new socket without breaking. After taking out the form the socket is cleansed with boric acid solution and anointed with vaselin. It may be kept packed with plain or iodoform gauze for a few days. There is no objection to leaving the new skin-lined socket empty for an indefinite period. A mistaken idea is

that the socket will be lost if an artificial eye or some form of dilator is not promptly introduced. I like to wait a week or more before putting in the prothesis, and it is permissible to wait any length of time. The cavity should be completely carpeted with skin. If there is a little break anywhere, a granulation may appear and have to be snipped off. After a few weeks, a little lacrimal fistula may form and lacrimal secretion may persist in small quantity. This is rather an advanatge, in keeping the artificial eye slightly moist.

Readjustment for Palpebral Fissure. Sometimes the lid margins do not grow together sufficiently following the canthotomy, and the palpebral fissure may be too long. If such is the case, the fissure should be shortened by cutting away the epithelium of both upper and lower margins for the desired amount of shortening, splitting the lids and sewing together the two posterior flaps with knots behind, and the sewing together the two anterior flaps. In this way, one can accurately graduate the shortening so that the palpebral fissure of the two sides will match in length.

Care of the denuded area on the thigh is very simple. Usually the graft has to be trimmed a little and any trimmings can be used to advantage by sticking them back on the denuded area so as to make islands from which epithelium will grow, and thus the time of the epithelization process is shortened. Either rubber tissue or vaselin gauze makes a suitable covering for the raw surface. Dry gauze is secured over it by adhesive strips and left for about two weeks, when the dressing can be taken off and left off.

If the surgeon has been successful in carrying out this technic, he will have a permanent socket, extending well beyond the canthi and of sufficient dimensions all around. The lids will be normally thin and pliable and the thin-walled socket will not prohibit mobility of the stump and artificial eye, altho the movements of the eye will be less than following ordinary enucleation.

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MEIBOMIAN GLANDS IN CHRONIC BLEPHARO-CONJUNCTIVITIS

SANFORD R. GIFFORD, M.D.

OMAHA, NEBRASKA.

Diseases of the Meibomian gland have received little systematic attention. After a brief historic introduction this paper describes and gives illustrative cases of simple hypersecretion, simple chronic inflammation, chronic Meibomitis with hypertrophy, chronic Meibomitis with chalazia, chronic conditions secondary to chronic conjunctivitis, especially trachoma, and chronic Meibomitis with concretions. This paper from the Department of Ophthalmology, University of Nebraska Medical College was read at a meeting of the Sioux Valley Eye and Ear Academy in Sioux City, January, 1921.

The affections of the Meibomian glands seems in some ways a rather trivial subject. The conditions involved are seldom very serious, and probably never by themselves cause any loss of sight. It is perhaps for this reason that the literature contains so few references to the pathologic conditions of these glands aside from those devoted to chalazia. I believe, however, that inflammation of the Meibomian glands, alone or as a complication of other diseases, is such a common source of obstinate discomfort among elderly people that a consideration of its types, with their symptoms and treatment should be worth a brief presentation.

The first mention I can find of this simple chronic Meibomitis, as it may be called, to distinguish it from that form in which chalazia occur, is that by Mackenzie in 1840.[1] He described as "Ophthalmia Tarsi" the condition in which the Meibomian secretion is increased in amount, and becomes puriform in character, the glands being distended with fluid which oozes out of them on pressure. Scarpa in 1895[2] appears to have described a similar condition as "The Puriform Palpebral Flux." Elschnig[3] mentioned the same condition in 1901, and in 1908 gave a classical description of what he calls Conjunctivitis Meibomiana, advocating massage of the lids as the treatment par excellence. He seems to have appreciated the essential chronicity of the trouble, teaching his patients how to squeeze out their own lids, so that, even after all symptoms have disappeared, they may do this every few months to prevent recurrence. Fridenberg,[4] the first American author to mention the condition, in 1903 described two similar cases, and mentioned the efficacy of squeezing out the lids in all cases of chronic blepharitis, superficial corneal ulcers, and other conditions where retention of secretion in the glands could add to the irritation. V. Michel[5] in 1908 discusses rather fully various disorders of the glands, acute and chronic. He calls attention especially to the changes in trachoma where the ducts become occluded, and crystic enlargement of some of the glands occurs, with atrophy of others.

In a society discussion in 1919[6] Thompson and Neeper both mentioned expression of the lids for the relief of these chronic inflammations, the latter stating that two or three expressions often restore normal function.

Closely allied with these cases of simple inflammation or hypersecretion are those with multiple chalazia associated with more or less inflammation of all the Meibomian glands. Addario[7] in 1888 described an extreme case of this kind with diffuse thickening of all the lids so that the eyes could not be completely opened. Fluid could be squeezed out of all the glands. A complete cure was obtained in 7 weeks by an ingenious method of expression with a modified Snellen's forceps, by which pressure could be maintained on each lid for 15 to 45 minutes at a time. Dianoux[8] in 1891 mentions these cases as fairly common in his practice, and under the name of "Conjonctivite à Chalazion," gives in most satisfying detail their clinical picture. He states that there may be months of congestion and mild discomfort before the first chalazion appears. When this is removed, the conjunctivitis continues till the next one develops, and these continue to keep up a chronic irritation for months or years, there often being several (even as many as 14) chalazia at once. In more severe cases, all the Meibomian glands secrete a whitish liquid or puriform matter. In treat-

ment, besides curetting the larger nodules, he rubs the lids with a yellow oxid of mercury and potassium iodid ointment for five minutes, producing a reaction during which smaller nodules are often absorbed. The four cases of Natanson[9] were of this type, one having 20 Meibomian abscesses at once. He mentions others of the simple type.

In these reports, no particular attention is given to etiology, except in that stye, our chronic cases seem to fall into five groups, which may be briefly characterized as follows:

1. *Simple hypersecretion:* The typical case shows little or no irritation, but simply an excess of secretion from the glands. It is usually seen as a frothy white scum, collecting about the internal angle, and requiring constant wiping. This scum is the waxy Meibomian secretion emulsified in the tears. Pressure on

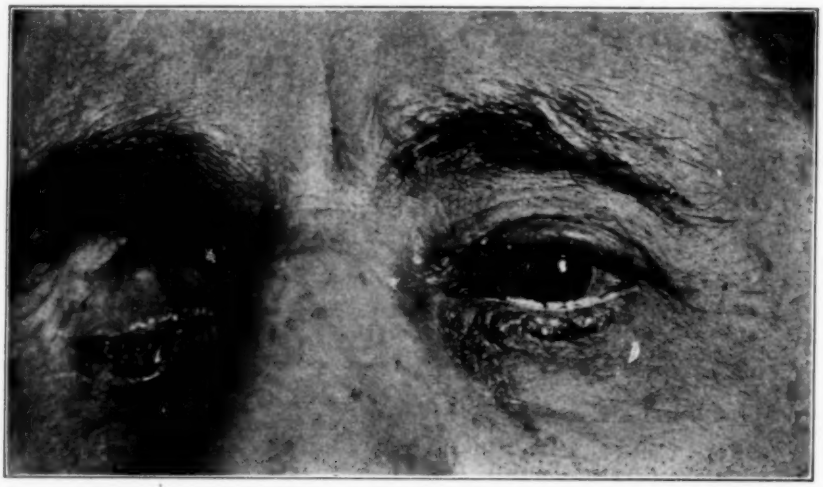

Fig. 1.—Extreme hypersecretion of Meibomian glands. Case 1. (Gifford).

of Dianoux, who attributes them to the socalled chalazion-bacillus. In a few cases, however, definite infection with unusual organisms has been recorded. Maklakoff[10] in 1901, described an infection of 5 years' standing with multiple Meibomian abscesses, from which B. ozenae was cultivated, it being likewise found in the nose. It was completely relieved by the heroic treatment of splitting the lids along their whole length, and thoroly cleaning out all the affected glands by curette and cautery.

The case of Reitsch[11] more resembled the simple type, without palpable nodules, but small ulcers around the mouths of the glands which were all full of fluid. Friedlander's Bacillus was isolated from the secretion and from the nose. Castelain[12] from recurrent Meibomian abscesses with diffuse thickening of the lids, isolated a Streptothrix.

Leaving out of account the acute cases of hordeolum internum or Meibomian the lids expresses a white waxy material; usually in semi-solid coils, but sometimes of softer consistency.

Case 1, is the most extreme example of it I have seen. Mr. G., aged 62, appeared with a mature cataract of L.E. R.E. had been removed. Both eyes showed a rim of frothy white secretion along the lid borders, and pressure on the Meibomian glands expelled from each gland a great excess of white waxy semi-solid material, which on being left in the sac assumed the same frothy appearance. (See Fig. 1.) The patient stated that this had been present for ten years or more, but that his lids had never felt irritated, and that it bothered him very little. Smears of the secretion showed a few slender Gram-positive bacilli, like B. Xerosis, and a few larger ones resembling hay bacilli. Cultures showed staphylococcus albus only. In preparation for his cataract operation, the lids were squeezed out daily for a

week, and his daughter was taught how to do this, but after a month of daily squeezing-out at home, with the use of zinc cerat ointment, the secretion remained undiminished, so the extraction was performed by Dr. Harold Gifford, and 20/30 vision obtained.

These cases are usually seen only incidentally with the occurrence of some other condition. Many old people, especially, show a greater or less degree of it, without any symptoms; so I have not noted its frequency in our cases.

2. *Simple Inflammation or Simple Chronic Meibomitis:* This occurs in the same type of patients as Class 1, and evidently often develops from it. Whereas in Class 1, the yellowish glands may be followed under the clear and uninflamed conjunctiva, in Class 2, the conjunctiva is reddened over the glands and becomes less transparent. Pressure on the lids forces out a whitish or yellowish cloudy fluid from some of the glands, usually not so solid as in simple hypersecretion. Often, gentle pressure expresses nothing from some distended glands since the ducts are closed up, but stronger pressure forces out large quantities of grumous fluid. The patients complain of burning or scratching, especially after reading. They often have refractive errors. Usually, however, correcting the refraction does not relieve the symptoms, as the changes, whatever their cause, persist. This is the type of case most frequently met with, and wherever an old refraction patient complains of symptoms disproportionate to his refractive error, we examine his lids carefully. One typical case will suffice to illustrate this class.

Case II, Mr. F., aged 60, complained of a burning sensation and tired feeling in his eyes for over a year. Vision was brought up to 20/20, both eyes, with a slight change in his refraction, and bifocals were prescribed. The lids of both eyes were thickened and inflamed along the ciliary margin, and the conjunctiva reddened over the glands. A large amount of semitransparent, honey-like fluid was expressed from most of the glands. As he was obliged to return home at once, zinc cerat ointment was prescribed to be rubbed into the lid borders at night, and his doctor was instructed by letter how to squeeze out his lids twice a week. A letter two months later reports no further symptoms and that he is continuing the treatment. His smears showed a large group of Leptothrix threads with a few isolated threads. Evidently a small mass of concretion of Leptothrix threads was broken up. (As only one large mass like this was found, it is questionable just how much this organism had to do with his condition.)

3. *Chronic Meibomitis* with *Hypertrophy:* This is only a more advanced stage of Class 2, and includes those cases who have in addition to the distended glands and congestion, a strip of hypertrophied conjunctiva along the glands, roughened and raised above the level of the tarsal conjunctiva, so that the glands can not be seen beneath it. It often occludes the mouths of some glands. In a series of 18 cases of chronic Meibomitis picked up from our records of the past year, only 3 could be said to fall in this group, the rest in group 2. These three were more refractory to treatment than the simple cases, and tho they may be kept comfortable, I would expect the strip of hypertrophy to remain much the same. I have seen no mention of this particular type in the literature.

4. *Chronic Meibomitis* with *Chalazia:* This is what Dianoux called "Conjonctivite à Chalazion," and his description could hardly be improved upon. In our experience, this occurs in younger people than simple Meibomitis. Of our 18 cases in classes 2 and 3 all were over 40 but six, eight were over 50, and only one was under 30. Of six cases from the past year which fall in class 4, however, only one was over 40, the ages being, 35, 30, 54, 28, 22 and 7 months.

Case III, a man of 28, is typical of this class. He has been coming in every two or three months for the past year, each time with one or more new chalazia. His whole right lower lid has become about twice its normal thickness and honey-like fluid can be expressed from all the glands. After curetting a chalazion and thoroly squeezing out the lids, with the use of zinc cerat ointment and heat afterwards, he will remain comfortable

for about a month. Then he will stop using his ointment, and after a week or so the burning sensation will return, increasing till he comes in to have another "lump" opened. I include in this class the 7 months' baby with about thirty small chalazia in the two right lids whose case has been reported before on account of the unusual finding of a fusiform bacillus in the cheesy material expressed.

trachoma, but who shows an atrophy and incurving of both his upper tarsi which makes it almost certain that he once had it, tho nothing active is left. He has left, however, the most surprising collection of a honey-like semipurulent fluid in all his Meibomian glands, with occlusion of some of the ducts. About 30 to 40 minims of this fluid can be expressed at one time, and on the following day just as much will be pres-

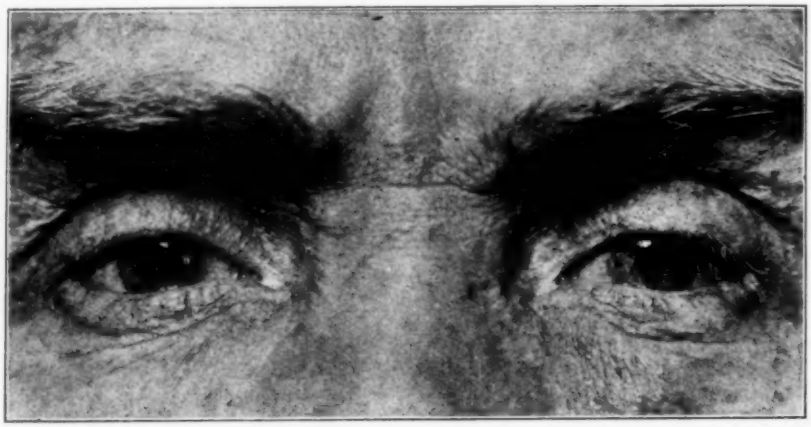

Fig. 2.—Extreme case of chronic Meibomitis, probably following trachoma, altho without such history. Case 4. (Gifford).

5. *Chronic Meibomitis* secondary to various forms of chronic conjunctivitis, especially trachoma.

Almost all cases of trachoma which have reached the atrophic stage show a dense connective tissue over and between the glands, which often occludes their ducts, producing retention cysts, and greatly increasing the irritability of these old eyes. Whether or not these changes themselves increase the trichiasis or cause mechanical irritation to the cornea, it is a fact that the corneal irritation is much less when the glands are periodically squeezed out. We do this in nearly all our atrophic cases, and there is one old man whose trachoma is entirely well, who comes in about twice a year to have his lids squeezed out, and insists that they be squeezed until they hurt.

Case IV, is an extreme case of this kind, of whom I have photographs. (See Figs. 2 and 3.) He is a man of 42, who is not conscious of ever having had ent. We have found that repeated squeezing out helps him very little, and a course of X-ray treatments had no effect whatever. Now that I have done a lip-flap operation on the worst eye for his trichiasis, he continues fairly comfortable, especially while he uses the ointment at night. Trichiasis has reduced his vision to R. 20/50 and L. 20/30, however, and his eyes are very easily irritated.

6. *Chronic Meibomitis* with *Concretions:* Many old people show one or more small white nodules under the tarsal conjunctiva, especially of the upper lids. There is often no inflammation seen about these, and they never cause symptoms till the conjunctiva over them becomes worn thru, so that they scratch the globe. Then their removal with the point of a Graefe knife gives complete relief. Most if not all of these concretions are deposits of lime salts in alveoli of the Meibomian glands, probably those whose connection with the main gland

has become occluded, so that lime is deposited in the inspissated secretion. The most marked cases of this condition are seen in old trachoma.

Case V. A man of 60 who had been under Dr. Harold Gifford's treatment for trachoma ten years before, came in complaining of a scratchy feeling in both eyes. No active trachoma was present, but the conjunctiva of both upper lids appeared as a thin membrane covering large masses of lime salts, which could be seen to follow the course of the Meibomian glands irregularly. Many of these masses were exposed and grated on a knife passed over them. At two sittings, a week apart, 50 to 75 of these masses were picked and curetted out of each upper lid. The patient left for a distant city, so that he could not be further observed.

In an attempt to get at the etiology of these conditions, I have given some attention to the bacteriology of this pathologic Meibomian secretion, as well as that of a series of normal lids, on which I hope to report in a further communication.

Fig. 3.—Also a picture of Case 4 to illustrate the method of squeezing out the retained contents of the Meibomian glands, which generally lessens the corneal irritation.

Besides the bacteriologic data obtained in this series, I consider it of great value to have observed the types of secretion in over 40 normal pairs of lids. When a case with red lids presents itself, the redness may or may not be due to Meibomitis. It is of importance to know whether the secretion squeezed out is pathologic. While the normal secretion is almost clear, especially at first, a little white waxy material is usually expressed, and I believe even rather large waxy casts of the glands are not pathologic. Softer grumous fluid, and especially yel-

low honey-like fluid is usually pathologic. Where nothing is expressed at first from some glands, and then large masses of grumous material, occlusion and retention are present.

TREATMENT: In the simple cases, squeezing out the lids between the two thumb-nails, has been the most important therapeutic agent. In mild cases, a few expressions will effect a cure, especially if applied early. In many cases of well-established inflammation, however, this is of use only as it affords relief from symptoms for a variable time, as the infection, or other causative factor, can not be eliminated. Correcting the refraction is, of course, often of great benefit to symptoms. We have found an ointment of much value to keep the lids soft, and the mouths of the glands open, and of the ointments, we have most used Chesebrough's zinc cerat, a preparation of zinc oxid in a stiff waxy base, which adheres well to the lids. This is best applied after a hot application at night.

For squeezing out, we have found no forceps as efficacious as the two thumb-nails pressed together. The two lids are held together, the nails pressing on the skin of both lids at once, not on the conjunctiva. Addario's idea of continuing pressure for a longer time with a clamp might find valuable application in some cases. Dianoux's method of giving sharp rubs with an irritating ointment to produce a reaction seems a rational procedure, but I must admit not having tried it.

While none of these agents will enable us to cure a good many obstinate cases entirely, we can relieve many or all of some of their symptoms, and keep most of the others fairly comfortable.

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RETINITIS OF CARDIOVASCULAR AND OF RENAL DISEASES.

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The form of retinitis first recognized in association with Bright's disease may arise independently of any kidney lesions. This paper endeavors to discriminate between the different lesions found in association with acute nephritis, chronic hypertension and nephritis and arteriosclerosis. Presented before the Sioux Valley Eye and Ear Academy, Sioux City, Iowa, January, 1921.

Some features of the ophthalmoscopic picture of the retinitis of cardiovascular disease and of renal disease are so uniformly found that their presence may be used as a basis for the classification of the retinitis into three fairly distinct types as follows:

1. The retinitis of acute nephritis. 2. The retinitis of chronic hypertension and nephritis. 3. The retinitis of arteriosclerosis.

To these three types must be added one other that may complicate the retinitis of chronic hypertension and nephritis, and the retinitis of arteriosclerosis, being somewhat dependent on arterial changes for its presence, that is, the retinitis of diabetes. It is quite probable that this type does not depend on diabetes alone.

Arteriosclerosis may or may not be a factor in the production of the retinitis of acute nephritis. In severe cases of acute nephritis, especially in young persons, there may not be any sclerosis of the retinal arteries. If the nephritis does not last too long all evidences of retinitis may disappear and the function of the eye be unimpaired. If the nephritis and retinitis should last for a long time, however, or if there should be a number of recurrences of the retinitis, altho of mild degree, the retinal arteries will then show signs of degeneration and sclerosis.

Nephritis may occur in a person who has a well developed general or localized arteriosclerosis with fibrosis or sclerosis of the retinal arteries. The ophthalmoscopic picture, then, is composed of features characteristic of arteriosclerosis and of acute or chronic nephritis as well. This is the form most commonly found in cardio-vascular-renal diseases of middle aged and old persons, the albuminuric retinitis that is of such grave significance. It may follow arteriosclerosis from any cause, and is usually accompanied by high diastolic blood pressure and increased blood urea with decreased functional activity of the kidney. In young persons it may result from repeated attacks of nephritis of mild severity, or a single attack of nephritis in persons whose arteries have become prematurely sclerosed.

The retinitis of arteriosclerosis was described by Moore, in 1916, as a condition separate from the retinitis of nephritis, and my own observations prove conclusively to my mind that there is a distinction. However, the retinitis of arteriosclerosis comes rather late in the course of the disease, and the affections of other organs, particularly of the kidneys as a result of sclerosis of their vessels, often produce retinal changes also, so that the ophthalmoscopic picture is made up of features characteristic of the two diseases, arteriosclerosis and nephritis. If the sclerosis of the retinal arteries is pronounced, the characteristic points of distinction between the sclerosis of involution processes, such as atheroma, and the sclerosis of chronic hypertension may be seen, even tho signs of renal impairment are also present to complicate the picture. This distinction between the sclerosis of hypertension and other forms was not made by Moore, but I believe that it is as definitely marked and as easily recognized as the distinction between the retinitis of arteriosclerosis and the retinitis of nephritis.

For the purpose of the clinician finding this difference is very significant, and not finding it deprives him of the privilege of actually seeing what is going on in the body. Arteriosclerosis of the retinal arteries from any cause may lead to arteriosclerotic retinitis. Atherosclerosis most frequently produces retinitis.

thru localized lesions in the artery wall and resultant localized areas of retinal ischemia and degeneration. It may exist alone without renal disturbance to complicate the vascular system. But the uniform sclerosis of hypertension may produce the same picture when renal impairment is long deferred, or well compensated, and no renal break occurs.

If to the retinal arteriosclerosis of either of these types are added the hemorrhages and exudate with sugar in the urine, the picture of the retinitis of diabetes is presented.

It may be said, then, that the most prominent factor in the production of retinitis of diseases of the vascular system and of nephritis is sclerosis of the retinal arteries, to which are added other features characteristic of the etiologic factor of the sclerosis, and a careful analysis of the ophthalmoscopic picture presented may indicate the type of constitutional disorder back of it all, and give important information with regard to its severity and course.

The chief reason for the early differentiation of the retinal changes lies in the possibility of averting serious damage to the kidneys by continued high diastolic blood pressure, which produces arterial thickenings. It has been shown that long continued hypertension produces degeneration of the middle coats of the arteries, that in turn contributes to diseases of the kidneys, brain, and other organs. It has been estimated that 40 per cent of persons with high blood pressure have changes of the retinal arteries that can be discerned with the ophthalmoscope, many of them in the early stage of degeneration; and furthermore, that with proper treatment and dietary control the increased blood pressure may be brought down to within limits of safety before organic changes are produced.

The sclerosis of the retinal vessels varies in appearance as the factors producing the sclerosis differ. The sclerosis of involutional degeneration is not the same as that of the degeneration that follows hyperpiesia, and both forms may differ from the sclerosis brought about by the perivasculitis of syphilis, lead poisoning, and other chronic intoxication. The ophthalmoscopic picture is not always clear and opinions of various observers may differ in cases not well marked, but a sufficient number of them may be differentiated to make the attempt well worth while because of the aid given the clinician in his attempt to determine a patient's condition.

When arteriosclerosis and nephritis occur concurrently, or consecutively, the picture presented by the retina is complicated; but a careful analysis of the retinal changes will allow of deductions with regard to which disease is responsible for the most active changes or will indicate the order of occurrences of the changes. When one disease follows another, as for instance, diabetes following arteriosclerosis, the earlier may be so masked by general symptoms and signs of the latter that it is not detected by general examination. Its effect on the fundus, however, may be traced definitely in most instances.

Arteriosclerosis plays a prominent part in the production of the retinitis of nephritis and of diabetes, besides producing in itself a characteristic retinitis. The arteries of the retina are affected in a manner similar to the arteries of the rest of the body. It is well known that atherosclerosis, the involutional type of arterial degeneration of the cerebral vessels, is frequently accompanied by sclerosis of the retinal vessels. The reversal of this is probably always true. A marked atherosclerosis of the cerebral and retinal vessels may be present with very little change in the systemic arteries, and not necessarily accompanied by high blood pressure. So too, a systemic sclerosis may occur with or without high blood pressure in a person free from sclerosis of the cerebral and retinal vessels.

The retinitis of atherosclerosis, when uncomplicated is characterized by arteriovenous compression, contracted arteries whose caliber is not materially decreased, pipe-stem sheathing, arterial plaques, beading, increase in the light reflex stripe, and silver wire arteries. There are arterial injection of the nerve head, giving it a brick red color, hemorrhages in the nerve fiber layer, proliferation of new vessels, and extreme tortuosity and increase in the

number of the arterial twigs in the region of the macula. Small areas of capillaries are deprived of blood supply, giving rise to ischemia and white spots. Only very rarely is edema present.

These evidences of arteriosclerotic retinitis are not always present at all times and all stages of the process. With this ophthalmoscopic picture and low blood pressure, cerebral arteriosclerosis and an absence of systemic sclerosis would be suspected. With high blood pressure, on the other hand, the presence of systemic sclerosis also would be suspected. The sclerosis of the arteries giving rise to this picture of arteriosclerotic retinitis has its origin in atherosclerosis, or toxic endarteritis known as secondary arteriosclerosis. Most commonly, however, the atherosclerosis is acting alone and with a comparatively low blood pressure, and when increased blood pressure is added, evidences of nephritis may appear with retinal signs characteristic of a renal break. The arteriosclerosis of the atheromatous type is, as far as we know, a primary disease of the arteries and is not dependent on inflammation of any particular organ, or on toxemias. It is the most frequent type of arteriosclerosis found among the insane, and often results in apoplexy or other central nervous system disturbances.

The arteriosclerosis of hyperpiesia is brought about thru effort on the part of the arteries to compensate for the increase in blood pressure and to bring about an adjustment between the forces of the heart's action and the peripheral circulation.

Whether increased blood pressure precedes capillary fibrosis or whether the fibrosis precedes the hypertension is an unsettled question. "The relation between arterial disease and kidney disease has been much discussed, some regarding the arterial degeneration as secondary, others as primary. There are two groups of cases, one in which the arteriosclerosis is the first change, and the others in which it is the secondary to a primary affection of the kidneys" (Osler).

We may state definitely, however, that fibrosis and sclerosis of the retinal arteries do not precede hypertension, but follow it after an appreciable interval. The hyperpiesia or essential hypertension brings about fibrosis and sclerosis of the retinal arteries, either by intermittent rise of blood pressure over a long period, or by a gradual but steady increase of blood pressure over a shorter period. Under continued hypertension the retinal arteries first become elongated and tortuous, the reflex stripe more prominent, and the arteries appear to be smooth and round. Later, the vessel walls become thickened thru a proliferation of the intima and thickening of the middle walls. This thickening leads to subsequent contraction of the arteries, narrowing of the caliber, narrowing of the reflex stripe, arteriovenous compression, increased caliber of the veins, and hemorrhages in the nerve fiber layers and in the deeper layers of the retina. The reduction in the caliber of the vessels is more uniform than in the arteriosclerosis following atheroma. The arteries are not beaded and there is little or no tendency to formation of perivascular sheaths, or to proliferation of new vessels. Quite frequently there is retinal edema. The arteriovenous compression is just as marked as in the arteriosclerotic type of retinitis, but there is not the tendency of the veins to cross under the arteries at right angles. White spots in the retina take the form of small white isolated or confluent plaques, creamy colored layers of exudate giving a rather bright luster. This type of sclerosis is associated with or followed by nephritis. It comes about in the prealbuminuric period (Mahomed), and constitutes the types of retinitis which we recognize as indicative of serious disease. Particularly is this true if, in addition to these features, there is edema over the disc margins with fresh hemorrhage and the formation of cotton-wool exudate. The retinitis of acute nephritis characterized by the intense edema of the nerve and retina, the injection of the smaller vessels, fine hemorrhages, and cloudy exudate, may be

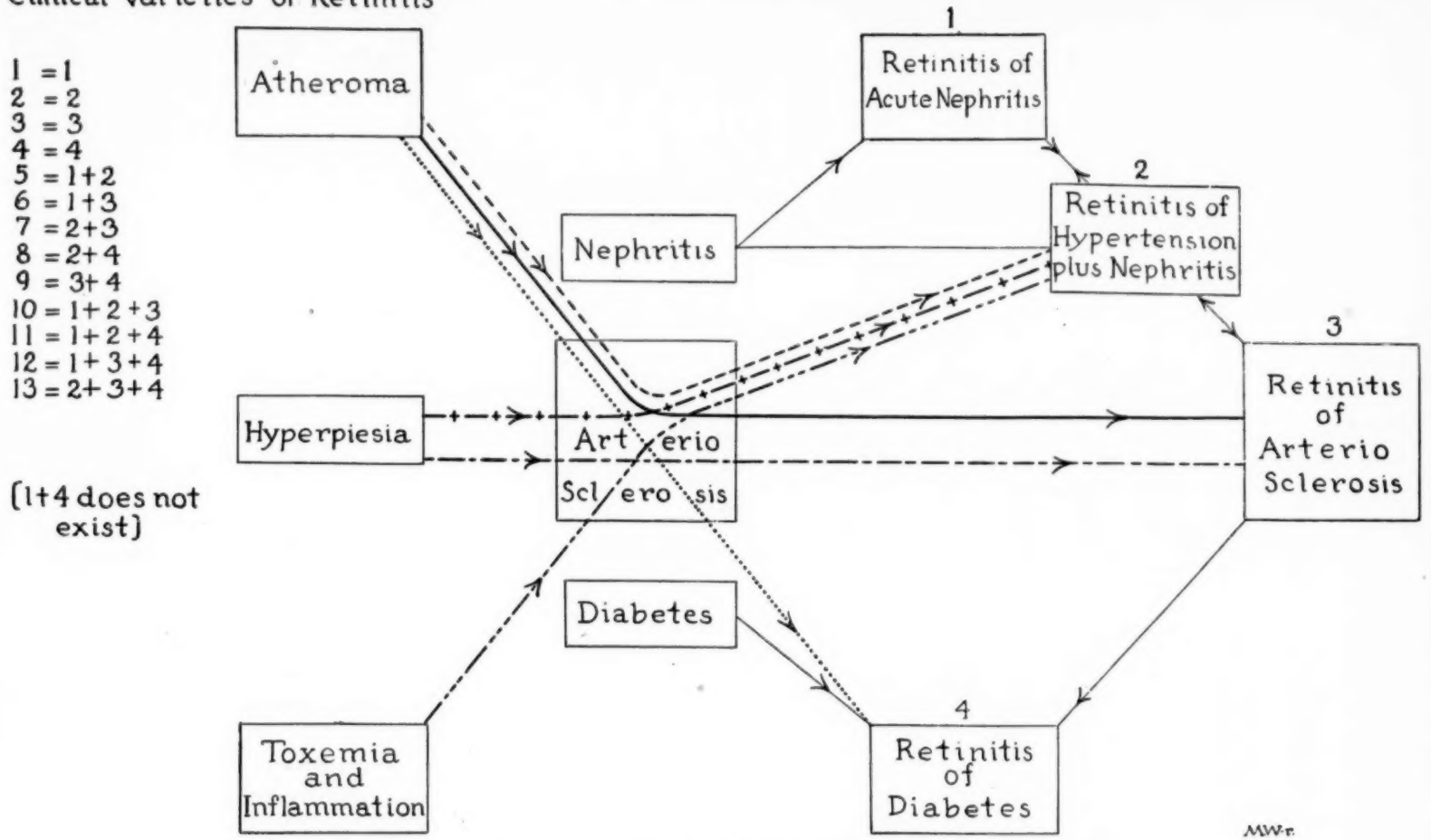

Fig. 1.—Diagram of the manner in which arterio sclerosis of the retinal arteries may be produced and the most frequent retinal condition following or accompanying such sclerosis.

added to the retinitis of "hypertension and nephritis," indicating a definite renal break with severe toxemia. Thus it will be seen that on the retinitis of arteriosclerosis which follows atherosclerosis may be superimposed retinitis of acute nephritis. It may be accompanied or followed by hypertention and nephritis, the nephritis of Bright's disease, and the ophthalmologic picture may show the changes characteristic of each.

It is possible for retinitis of nephritis and of hypertension to occur as a result of repeated attacks of nephritis without preceding hypertension, the thickening of the arteries in this case resulting from the repeated perivasculitis and chemical changes in the blood, and the temporary rise of blood pressure during the attack. Combinations of two or more of these three types are quite frequently found in the retinitis of cardiovascular-renal disease.

The retinitis of diabetes, which long has been supposed to be due to some chemical in the blood, is quite probably due primarily to arteriosclerosis. Added to the arteriosclerotic changes are the small, round hemorrhages and retinal exudate and edema which characterize the retinitis of diabetes. Wagener and Wilder, during the past year, have studied cases of the retinitis of diabetes and have found that the characteristic picture known as diabetic retinitis occurred only in persons having arteriosclerosis. It does not occur in the grave forms of diabetes. Diabetes and nephritis may occur together, each presenting characteristic features in the retina. Not infrequently the retinal changes of one disease will be more marked in the retina than the changes of the other disease, and from the picture presented may be deduced which of the two has been active the greater length of time. (See diagram, p. 498.)

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THE OCULAR BLOOD TENSION.

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The blood pressure within the intraocular vessels has recently been the subject of numerous intelligent investigations. The results of these studies are here summarized in a way to bring out their practical applications and importance. Read before the Wills Hospital Ophthalmological Society, March 1st, 1921.

Altho some isolated vascular phenomena, such as the glaucomatous pulse, have long been observed, the systematic study of the ocular blood tension has only been undertaken within the last few years.

Von Schülten (1884) raised the ocular tension by introducing an injection needle connected with a manometer, in the vitreous of albinotic rabbits. He notes the appearance of the retinal and choroidal pulsations and concludes the diastolic blood pressure to be from 90-100 mm, and the systolic from 110-120 mm.

Bailliart (1909), and Melville Black (1911) noticed that the required pressure of the finger on the globe, necessary to produce a retinal pulsation, was much greater in some instances than in others.

Thomson Anderson (1914) was the first to attempt to measure the vascular tension in the human eye. For that purpose he used a common Geneva lens measure, to the sharp point of which a knob had been attached. The apparatus made, thru the lid, a gradual pressure on the globe. A diastolic blood pressure of 25-30 and a systolic of 70-80 mm. were found. The fact of the apparatus being applied through the lid, greatly lessened its accuracy. Nevertheless, it enabled one to compare the results obtained in different instances. He did not continue his investigations beyond this.

Moore (1916) studied the oscillations of the needle of the Schiötz tonometer in arteriosclerosis, observing that these oscillations, which exist in normal eyes, disappear in arteriosclerosis. He stated that the vascular tension is lessened in this condition. This was not due to a lowering, but to a raising of the blood pressure, so that the weight of the instrument was no longer sufficient to flatten the artery during the diastole, a condition necessary to the production of pulsations. As Bailliart stated it would have sufficed to increase the weight to cause the reappearance of the pulsations.

Priestley Smith (1917-1918) investigated first the physical conditions of the circulation in a set of glass tubes reproducing the essentials of the vascular system. He studied mainly the influence of the enlargement of the cross section of the frictions and of the viscosity on the tension of the liquid. Applying his results to the researches of von Schülten he lessens slightly the figures of this investigator and concludes that the arterial diastolic tension is 90 mm. and the systolic 110 mm.

To P. Bailliart belongs the honor of having given to the study of the vascular tension a more practical solution, and also of having penetrated much more deeply into the subject.

As in the preceding studies his dynamometer was based upon principles of oscillometry (which is not quite useless to remind here).

In the retinal vessels of a normal eye, no arterial pulsation is to be seen, and in only 30% of the cases is there a real venous pulse.

We see no arterial pulse on account of the fact that the arterial blood pressure, even in diastole, is notably higher than the intraocular tension, consequently the vessels remain constantly full and tense.

If, from any cause, the intraocular tension is increased to the point where it equals the retinal diastolic blood pressure, the artery will empty and flatten during each diastole, and fill during each systole—thus producing a pulsation.

If the intraocular tension be further increased, it will eventually equal that of the systolic blood pressure and at

this point the artery will be completely and permanently emptied, so long as this increased intraocular tension may last.

This condition of affairs is seen in glaucoma, and is the principle upon which the dynamometer of Bailliart is based.

This instrument, with which we are enabled to take the retinal arterial and venous blood pressure consists essentially of a piston, the extension of which is applied to the sclera near the outer canthus, enabling one to produce a progressive increase of the tension of the eye. The instrument is graduated in grams so that its accuracy may be tested previous to its use with an ordinary balance.

As an example, suppose one perceives retinal arterial pulsation when the reading on the scale of the dynamometer is 20, this, added to the tonometric findings, and the result compared with a table prepared by Bailliart, will give the retinal diastolic blood pressure, in mm. of mercury.

According to experiments conducted with this apparatus the normal diastolic blood pressure in the central retinal artery is 30 mm. of Hg, and systolic is 70-80 mm. of Hg. He will study later the modifications of these pressures in pathologic conditions.

The study of the choroidal pressure is also of interest. Those of us who use the tonometer have no doubt observed the oscillations of the needle, generally considered as evidence of correct application of this instrument to the cornea. These oscillations are produced by the pulsations of intraocular vessels and since the choroid contains 80% of the arteries of the globe, these oscillations may be considered as being produced by the choroidal circulation.

Applying to these oscillations the principles stated above for the determination of the retinal pulse, we know that the oscillations of the needle have reached their maximum when the intraocular tension added to the weight of the tonometer equalizes the choroidal diastolic blood pressure, and that the oscillations disappear when those two elements have reached the systolic pressure.

Hence it is a means of measuring the total arterial pressure of the eye and practically, that of the choroid.

Bailliart has so modified the Schiötz tonometer that successive weights may be added and a graphic curve of the pulse may be obtained by means of photographic registration.

In these experiments, account must, of course, be taken of the ocular tension. In a recent article (1920) of G. Leplat the results of investigations of the tension in the blood vessels of the iris are recorded.

In a dog, the large terminal vessels of the long ciliary arteries are very well seen even by the naked eye. Increasing intraocular tension by pressure of the dynamometer produces pulsation in the vessels of the iris, which reaches its maximum when the intraocular tension equals the diastolic pressure, this pulsation disappearing as soon as the intraocular tension reaches the level of the systolic pressure.

The diastolic pressure is 50-65, the systolic 80-90 mm. A comparatively lower pressure in the human iris must, of course, be expected, on account of the greater distance between the carotid and the eye, and also on account of the erect position of the human body. The action of various drugs on the blood tension of the iris has been studied by Leplat. Atropin increases this pressure very sensibly without modifying the ocular tension at all.

With cocain the blood pressure is also increased, but not so much as with atropin. The ocular tension is slightly elevated. Eserin and pilocarpin produce a vasoconstriction, but do not modify the blood tension.

Dionin does not give any result,

Adrenalin produces a strong rise of blood tension; 80 mm. diastolic—130 mm. systolic.

The measure of the ocular blood tension has a physiologic and also a pathologic interest. Tho dependent upon the general blood pressure, the vessels of the different sections of

the body have some independence, being provided with muscular coats, under the influence of the two sympathetic systems.

As we shall see, the eye is no exception to this rule. As shown by Bailliart, in many cases of primary glaucoma, the retinal blood tension ascends and descends parallel with the ocular tension, and this without any modification of the general blood tension as shown, for instance, in the following cases:

To=Ocular tension. Ta=blood tension in the central artery of the retina.

Primary glaucoma.

January 10.	R.	To=45 mm.	Ta=45—80 mm.
	L.	To=45 mm.	Ta=45—80 mm.
January 12.	L.	To=35 mm.	Ta=36—72 mm.
January 14.	R.	To=45 mm.	Ta=45—80 mm.
	L.	To=45 mm.	Ta=45—80 mm.

The following case of glaucoma, secondary to iritis, in one eye, is still more striking.

R. To=20. Ta=25—55 mm.
L. To=75. Ta=36—65 mm.

In a case of optic atrophy, consecutive to a considerable hemorrhage, reported by Magitot, the central artery of the retina had recovered its normal pressure much sooner than the humerals.

Let us now determine some pathologic facts. As we have just seen, in many cases of primary or secondary glaucoma, the retinal blood pressure increases with the ocular tension. The same is true in several cases of traumatic glaucoma published by Bailliart, in which the arterial tension rose with the ocular tension, and only in the injured eye.

In the albuminuric retinitis, the diastolic retinal tension is always greatly increased, and very early, so that Bailliart states that a retinitis without retinal blood hypertension is not of the albuminuric type.

Again, according to that author, in the syndrome known for a long time, which consists of sudden and momentary loss of vision and which has been attributed to spasms of the central artery, the retinal tension is considerably increased and the spasms are produced by this increase of tension.

Magitot, in a case of posthemorrhagic atrophy, has found a retinal diastolic tension less than 15 mm. in the central artery. The tension being, of course, still lower in the capillaries, he suggests that these atrophies might be due to an atrophy by anemia of the ganglion cells of the retina and advises that the patient be kept in a horizontal position, and even in the Trendelenburg position, in order to raise the retinal blood tension.

Duverger and Barré, using the dynamometer of Bailliart, have found an average tension: diastolic 50-60 mm. systolic 100 mm. for the central artery of the retina.

Furthermore, they state that the ocular and the blood tension are independent of each other, and that the retinal tension is equal to the humeral tension, less the difference of level between the eye and the humeral artery.

Velter found a diastolic tension 35 and a systolic of 65, and emphasizes the close interdependence of general and retinal blood pressure. It should be noted that the researches of Duverger and Barré were made with the indirect method which might give less accuracy in the perception of the first arterial pulsation.

In short, whatever the imperfections and the value of all these methods may be, the relativeness of which is emphasized by these authors, they constitute the first steps in a new line of experimentation which is full of promise.

[The writer wishes to thank Dr. W. Zentmayer for the valuable aid in helping him to present this article in a form more acceptable to the English reader.]

SPASM OF THE CENTRAL RETINAL ARTERY.

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With the review of previously reported cases is here given the account of a new case studied in the Clinic of Dr. H. W. Wootton at the Manhattan Eye, Ear and Throat Hospital.

Spasm or cramp of the arteries of the retina, of transient duration, has long been known, but only a fortunate few have observed this rare and interesting phenomenon. The actual physiologic process which takes place is a spastic contraction of the smooth muscle fibers in the middle coat of an artery, with resultant temporary obstruction to the blood supply. That such a spasm of the retinal arteries may occur, of sufficient degree to cause a temporary partial or complete obstruction to the flow of blood, seems proven without a doubt. (Greenwood.)

In the cases hitherto reported the extent of the involvement has varied from spasm of an individual small branch of the retinal circulatory system to involvement of the central artery. Spasm of the arteria centralis nervi optici occurred in Jamieson's patient, a man aged 84, the artery fading into a mere white line, this being followed by fading of the vein and its branches. Cases reported by Quaglino, Siegrist and von Graefe showed the larger arterial branches involved, while Parisotti describes the condition in a patient where the process was limited to the arteries of the upper half of the retina. In Crisp's case the upper temporal artery was involved while several observers have seen the phenomenon occur in the inferior temporal artery. Harbridge reports two cases where the inferior temporal artery was involved, the second case showing interruption of the blood current just after the artery left the disc. This interruption passed toward the periphery of the fundus while a similar process in the veins passed from the periphery toward the disc.

As regards the etiology of this condition, Langdon has stated that cases of spasmodic closure of the retinal arteries can be divided into two classes: (1) where the first attack occurred at or after middle life and there was evidence of cardio-renal disease; (2) a few cases in early life without any other symptoms of cardiovascular disease. De Schweinitz and others seem agreed that certain vasomotor phenomena are responsible for many instances of ischemia of the retinal vessels, some being due to physiologic and others to pathologic reflexes. The same author draws attention to Priestley Smith's assertion that a similar clinical picture can be produced by vasomotor spasm of the cortical visual centers. The exciting causes reported are many and varied. Temporary blindness with retinal ischemia due to extreme narrowing of the blood vessels has been seen in the collapse stage of cholera (Graefe), in whooping cough (Knapp), erysipelas (Ayres), Jacksonian epilepsy (deWecker), hemlinthiasis (Farravelli), in Raynaud's disease and intermittent fever (Schnabel), malaria (Ramorino), migraine (Siegrist and others), in poisoning from quinin, salicylic acid, lead, antifebrin (Hilbert), and potassium bromid (Rubel), in arteriosclerosis (Wagenman), in hematoma of the frontal region (Van de Graaf), and even after the repeated use of an icebag (Zehender). In a number of cases the authors have stated the etiology as unknown (Alexander, Beard, et al.). H. D. Bruns reported a case in a young neurotic girl with "a nervous system faulty from the first thru inheritance, unable to regulate nicely the blood supply to every portion of the body, and that, in the imperfection of excretion by means of the kidneys and the menstrual flow we see merely the closure of a vicious circle." Von Graefe considered the probable cause of blindness in his case an insufficient supply of blood to the retina, the faint and rapid heart contractions not being enough to overcome even the normal intraocular tension. Correctness of this view is strengthened by the fact that after all other remedies failed an iridec-

tomy restored the sight. A number of cases of sudden complete blindness have been observed in perfectly healthy, normal individuals, mostly young (Beard). In spite of all the evidence at hand Parsons states that records of spasm of retinal vessels observed ophthalmoscopically are always to be received with caution, as the condition is easily counterfeited when vessels are badly filled from any cause.

Spastic ischemia is as a rule monolateral, altho Noyes reports two cases where both eyes were affected. The onset is sudden and the recovery with restoration of the circulation may occur just as suddenly, or the refilling of the vessels may be gradual (Van de Graaf). The length of time until vision is restored has varied from one to fifteen minutes or more. In Crisp's patient the interruption in the blood stream showed no change during three days in which she was carefully observed and after the second week circulation was only partially restored. The amount of visual defect varies from loss of vision in a small portion of the field to retention of light perception only, depending on the site of the lesion and number of arterial branches involved. The typical picture shows extremely attenuated arteries altho Crisp states that in his patient the empty part of the vessel appeared always of normal width. In Ramorino's case the veins were also markedly contracted, in von Graefe's they were tortuous and dilated, while in the one reported by Farravelli they were congested and pulsating. The optic disc becomes perfectly white and pale and the retina pale. As the attack subsides the veins are the first to resume their normal caliber, then the pallor of the disc and retina disappears, and vision returns. The arteries may be some time in resuming their normal appearance.

CASE REPORTED

A man, aged 34, marine insurance agent, appeared at the hospital August 29th complaining of sudden loss of vision in the left eye, the morning of the same day, with just as sudden return of vision a few minutes later. During the day he had had several similar attacks. Had always had excellent vision and denied any previous ocular disease. Gave a personal history of measles in childhood and malaria in South Africa in 1901. The malaria had been apparently cured at this time as he had never had a recurrence. During the war he served as an officer in the British army and in 1915 had a severe attack of pneumonia. Denied luetic infection but had gonorrhea ten years ago. Is married but has no children. There is no history of ocular disease in the family but several relatives died of nephritis. Is as a rule in excellent health but has a tendency to be constipated and smokes to excess. Recently however, he has suffered from slight frontal headaches, usually coming on in the morning. Sometimes would awake with dull pains in his head, at times accompanied by dazzling sensations in the eyes. But he has had no headache, dizziness or nausea since the onset of the present illness.

Physical examination shows a well built and well nourished male. Skin of good color, no visible signs of arteriosclerosis, mouth clean, teeth in good condition, tonsils small and not diseased. Lungs clear, heart rate regular and rhythmic, sounds of good quality with a soft blowing, systolic murmur at the apex. Pulse is 72 and did not vary during the attacks of blindness. Blood pressure: systolic 146, diastolic 96. Laboratory examinations showed a negative Wassermann; urine of specific gravity 1.032, moderate excess of indican, urea 2.6%, no albumin, sugar or casts. Blood count: W.B.C. 6,100; polymorphonuclears 60%, small lymphocytes 36%, large lymphocytes 4%; R.B.C. 4,300,000, hemoglobin 75%. X-ray examinations showed no disease of the accessory sinuses but disclosed a small alveolar abscess at the root of the first molar, upper left. This tooth was extracted the next day.

Ophthalmic examination showed vision of 6/6 in each eye. Externally nothing pathologic in either eye. The pupils were two millimeters in width,

equal, and reacted promptly to light and accommodation. Examination of the eyegrounds in the intervals between attacks showed discs of normal color, distinct margins and no variations in level. The vessels were of normal size without tortuosity while the maculae and periphery exhibited no signs of disease. There was a normal venous pulsation present in the large veins on the papilla in each eye. Under homatropin the refraction was one diopter of hyperopia in each eye. The fields for form and colors were normal.

During the attacks the vision, in a few seconds, diminished to hand movements only, and the fundus of the left eye showed the following striking picture: the nerve and retina decidedly paler than in the right eye; the arteries are all markedly contracted appearing as mere threads; the veins show entire cessation of blood flow, the regular venous pulse ceasing entirely; the blood in the veins assumes a granular appearance due to the breaking up of the normal blood column; in from one to three minutes the flow of blood in the veins recommences, at first slowly, then more rapidly, the venous pulse reappears, the arteries assume their normal caliber and appearance and vision rapidly returns to normal. During the time of the attack no red spot was seen at the macula.

September 1st, four days after the onset, the attacks had increased in number to ten a day, but the patient was of the opinion that the individual attacks were not as prolonged or intense. By September 4th the number of daily attacks had decreased to two a day, both very brief. Next seen on September 7th when he stated that all attacks had ceased since the night of the 5th. On the 4th eserin had been instilled at the clinic and prescribed for home use. When seen on the 7th the tension in the left eye, by manual palpation, was distinctly less than in the right eye. By the 12th the tension in the left eye had again risen and was now normal and equal to that in the right. When seen for the first time sodium bromid, nitroglycerin, cathartics, and a meat free diet were prescribed and the patient was told to reduce his daily allowance of tobacco. The bromides were replaced the second week by iodid of potash. After September 12th the patient was not seen again for two months, when in response to a letter of inquiry, he came to the hospital and stated that he had had no recurrence of his trouble and was in excellent health. At this last date ophthalmoscopic examination revealed nothing pathologic in either fundus.

DISCUSSION.

The case reported above was observed during repeated attacks with no variation in the ophthalmoscopic findings as reported. In manner of onset, limitation to one eye, appearance of the vessels, optic nerve and retina, and in the rapid recovery and return to normal vision, it resembles many of the cases previously reported. However the complete stoppage of the flow of blood in the veins with the breaking up of the venous blood column into irregular granular appearing masses was a particularly striking phenomenon and one which has not been mentioned by previous writers.

Treatment in most cases has been largely based on the finding of some concurrent systemic disease. For the local condition nitroglycerin seems to be the favorite drug prescribed. Operative measures employed have been iridectomy and paracentesis. Von Graefe obtained a cure in his case with iridectomy which would seem to substantiate his belief that the probable cause of blindness was an insufficient supply of blood to the retina because of a general depressed circulation. The striking lowering of the tension in the writer's case after the use of eserin, with resultant improvement in the number and severity of attacks, would seem to place this case in the same category. But on the other hand the discovery of an alveolar abscess would raise the interesting question as to whether the attacks might not have been reflex manifestations of a focal infection.

The writer takes this opportunity to express his indebtedness to Dr. Wootton for the privilege of reporting this case from the latter's clinic.

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SOME CLINICAL PHASES OF OCULAR INVOLVEMENT IN SINUS DISEASE.

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This subject is reviewed especially with reference to purulent sinuitis, eye lesions in which sinus disease cannot be demonstrated and functional disturbances of the optic nerve. It is illustrated by brief records of five cases. Read before the Academy of Medicine of Northern New Jersey, March 14th, 1921.

The influence on the eyes of sinus disease has received more or less attention in special literature for about twenty-five years or more. Numerous papers have been written and there is a rather decided unanimity of opinion on certain conditions but a diversity on others. As the question is to a great extent a matter of clinical judgment it may not be amiss to discuss it in the light of an individual experience.

Mackay,[1] classifies the diseases of the nasal sinuses affecting the eye in four groups:

First; Mucoceles of the sinuses;

Second; Acute or chronic sinuitis with external signs of orbital cellulitis, orbital abscess, tumor growth, edema of the eyelids or apparent dacryocystitis;

Third; Sinuitis without external signs of orbital inflammation but with ophthalmoscopic signs such as optic neuritis, neuroretinitis, retinal thrombosis or phlebitis, or without ophthalmoscopic signs but with visual disturbances such as central scotoma, visual field defects, ocular muscle paralyses or fifth nerve disturbances;

Fourth; Cases in which the association of sinus disease has been asserted but which Mackay considers questionable, such as glaucoma, iritis, uveitis, keratitis, and lens and vitreous opacities. "Another class which is very important to the ophthalmologist has been omitted, namely the unilateral headaches and asthenopic symptoms due to rarefaction of the air within the frontal sinus and anterior ethmoidal cells." [Brawley.[2]]

It is perfectly evident as we glance over this classification that it covers a very wide field and is orderly only in so far as it relates to the clinical picture. It seems preferable, therefore, to speak of the sinus conditions and the effects they may produce more in accordance with what we know of the pathologic conditions.

PURULENT SINUITIS.

There seems no reason to doubt the existence of a certain type of case as of sinus causation, in view of the numerous cases which have been observed and reported. A sinus toxemia, of antral, frontal, ethmoidal or sphenoidal origin is perfectly capable of causing plastic inflammation of the iris, ciliary body, choroid or optic nerve. The uveal disease in such cases is sharp and severe in its type, and if an iritis, may be accompanied by hypopyon.

General symptoms as headache, fever, anemia and leucocytosis will usually be found, and the X-rays will show an increased density in the area of the affected sinus. Rhinologic diagnosis is only difficult if the purulent collection is shut off in a completely enclosed cell, as it may be in posterior ethmoidal and sphenoidal conditions. However, repeated nasal examinations with cautious exploration will often uncover the telltale drops of pus.

It is usual in such cases to have a rapid improvement in the eye condition following a radical sinus operation, an improvement which is practically confirmatory of the etiology, altho the complete subsidence of the eye disease may be a matter of some days if the iris be involved and of some weeks in the case of the choroid. Cases of this type presuppose a process of some duration and in such, a diagnosis is often not a difficult matter.

Purulent disease of the ethmoids or sphenoids may attack the eye, not so much by a general toxemia as by a more localized process. Iritis, choroiditis, cyclitis, or optic neuritis may occur, and the diagnosis may present considerable difficulty. In general it may be said that in the absence of local symptoms in the nose, or of any suggestive appearances in the X-ray examination, dependence must

be placed in the absence of other causes for focal or general infection, in the teeth, blood, tonsils, or intestines, the type of the local process, and the fact that it is unilateral, as so many of these cases are apt to be.

Certain types of uveal disease are suggestive, a plastic iritis with or without hypopyon, (hypopyon is more apt to occur in a more extensive sinus process with general toxemia) a simple cyclitis with marked plastic deposits; choroiditis with marked plastic exudations in the choroid and retina or in the vitreous, or an optic neuritis with marked inflammatory exudates. In this connection it is well to lay stress upon the difference between an optic neuritis with one or two diopters of swelling and marked plastic exudates and perhaps hemorrhages, and a choked disc with swelling of three or more diopters with slight inflammatory signs in proportion. If seen at the outset, the differential diagnosis should not be difficult. It is certainly very doubtful that sinus disease can produce a choked disc unless accompanied by cerebral complications which give rise to increased intracranial pressure.

A unilateral inflammation, iritis, cyclitis, choroiditis, or neuritis, is very suggestive of a local causation. This is particularly the case if the inflammation is of marked degree in one eye, and of some days' duration, while the other eye remains normal. If the causative agent be a general toxemia there seems on the face of it no reason why a susceptible tissue should be affected in one eye and not in the other. Clinical experience certainly bears this out; and it is unusual to find an iritis, for example, due to general toxemia in which both eyes are not affected altho one may be somewhat in advance of the other in point of time. These facts are well known but seem to be somewhat too frequently lost sight of, and have an important bearing in the diagnosis of sinus disease.

EYE LESIONS IN WHICH SINUS DISEASE CANNOT BE DEMONSTRATED.

There are two especial varieties of eye disease belonging to this class: *First;* Choroiditis, *Second;* Functional disturbances of the optic nerve.

Choroiditis is manifested by numerous fine "dusty" opacities all thru the vitreous. An indistinct view of the fundus can usually be obtained, but no choroidal exudates can be seen. It is very unlikely that any of these opacities are derived from the ciliary body as such cases do not primarily show changes in the intraocular tension and the ciliary anastomosis is not engorged. In fact, the vitreous opacities are the beginning and end of the clinical picture, and even after the process clears up, no atrophic spots can be found in the choroid. The vision is often surprisingly good but the patient complains of seeing numerous floating spots or "clouds." Flashes of light are not seen, or are very slight, certainly not so prominent a symptom as in a more extensive retinochoroiditis.

Later in the process the fellow eye may be involved thru extension of the process to the other side of the sinuses. Secondary glaucoma may supervene and is apt to be of the subacute type with rise of tension of 40 or 50 mm. (Schiötz) and without much pain or redness; in other words, a type due to posterior retention of the lymphatic fluids rather than anterior. All search for a constitutional toxin is negative and the X-rays give no suggestive findings.

Under such circumstances the ethmoids, particularly the posterior, and the sphenoid, must be well opened and good drainage established. To the rhinologist it seems as if he were operating on normal tissues. No pus nor exudation is found and no evidence of sinus disease. Soon after the operation, however, the ocular condition shows signs of improvement. No more opacities in the vitreous are formed, those present begin gradually to absorb, and if increased tension be present it gradually comes down to normal. It is hardly necessary to say that complete resolution is a matter of some weeks or even months and that frequently a few fine opacities remain, but good vision should be the rule if the operation has not been too long delayed. Iridectomy is seldom required unless the process has been a long continued one with a long con-

tinued elevation of tension. It is, moreover, very disappointing in its results and if it be done primarily the tension is likely to recur until the choroidal process is checked by the sinus operation. The seat of trouble is usually the ethmoids, probably the posterior ethmoids. The exact nature of the pathologic process is at present not definitely known.

Functional disturbances of the optic nerve. The most striking and characteristic type of this class of cases manifests itself by a partial central scotoma of about 20° radius (concentric); with color blindness in the scotoma, and not the slightest appearance of optic nerve disease discoverable by the ophthalmoscope. The symptoms come on rapidly and may remain unchanged for a long period of time. The vision falls off to 20/50 or 20/70 and at times the test types show distortion. There are no general symptoms. X-ray and rhinologic examinations are negative. The condition is always one sided, and has not the same tendency to involve the fellow eye that occurs in a purulent sinuitis. After a period of slight fluctuation the vision at times becomes steadily worse and entire perception of light may be lost. Of course, total atrophy of the optic nerve follows if the trouble is not promptly relieved at this stage.

The diagnosis is easily made in the most characteristic form of the disease, and yet general tests, Wassermann, teeth, tonsils, intestines, etc., should not be omitted. If the case be seen when the vision is very far gone the diagnosis must rest on the absence of fundus signs, the absence of visual disturbances in the fellow eye and the absence of other causation.

A frequent criticism has been made that such cases are hysteric and that they are relieved by the moral effect of the operation. There is no way of absolutely disproving this assertion until the true pathologic condition can be demonstrated. A very important point is as to whether the direct pupillary reaction corresponds with the amount of vision. It is usual for such cases to show a certain fluctuation in the vision and to this fluctuation the pupillary reaction should consistently correspond. Inconsistency is one of the most definite signs of an hysteric process. If the case be carefully studied an error in diagnosis should not often be made. It is certainly better to open the sinuses in a hysteric case than to allow a patient to acquire an optic atrophy from sinus disease in the presence of a wrong diagnosis of hysteric blindness.

As in the previous class of case, no evidence of sinus disease can be found during the operation. Some observers speak of finding the mucous membrane lining the sinuses, "dark, red and congested," but there seems to be no unanimity on this point, at least, among the rhinologists with whom I am acquainted. A free opening of the sphenoid and adjacent ethmoid cells should be made and in twenty-four to forty-eight hours the vision in the affected eye should begin to improve. Scotomas with only moderate decrease in vision may disappear entirely, while the more severe cases may show material gain, tho the final vision may not be secured for several weeks. In certain cases where perception of light is lost, the periphery of the field is first restored, the case passing thru the color scotoma phase, to finally normal vision. Where the case has gone on to atrophic changes in the optic nerve, it is usual to secure a marked improvement in vision if the operation has not been too long delayed.

As to the pathology of these cases, it seems on the face of it that the disturbance is most probably a mechanical one. Brawley[3] says that, "In some cases the process is undoubtedly a toxemia and the highly organized optic nerve fibres to the fovea are the first to suffer, which explains the frequency of central scotoma." It is true that the choroiditis cases mentioned above show enough exudation to suggest a toxemia, but the optic nerve cases, particularly the last mentioned class, recover too quickly to be explained in this manner. All demonstrably toxic lesions of the optic nerve, without exception, are slow to recover and restor-

ation of vision is a matter of days or even weeks. Unquestionably the bleeding and depletion of the sinuses has a favorable influence, but it seems as if there must be some low grade inflammatory process, in the bone or periosteum which causes a fluid pressure on the nerve which subsides rapidly after the operation, allowing a speedy restoration of function.

Finally the practical question confronts us: Are we to allow a dangerous process to go on merely because we cannot invariably demonstrate it with certainty? Opening the ethmoids and sphenoid is not a dangerous operation when done with proper care, and it is certainly better in doubtful cases to operate than to risk allowing a latent trouble to continue.

CASES

A few illustrative cases may be briefly cited. 1. L. Male, 44, first presented himself June 4, 1917. The right eye was slightly congested and he had a number of precipitates on the posterior surface of the cornea and a discolored iris. The attack had lasted several weeks, without much change. R. V. = 20/30 + with + .50 cy. ax. 90°. He had had a similar, less severe, attack one year before which had recovered very slowly. General examination elicited little of importance. X-rays of the teeth showed no signs of a toxic process. His hemoglobin was 82%. He had a moderate leucocytosis. He was somewhat pale and had a certain amount of intestinal putrefaction. Nasal examination by Dr. J. E. MacKenty showed nothing. X-ray examination of the sinuses showed no marked density changes.

He was treated with atropin and hot applications and finally, early in July, pus was found in the region of the sphenoid, by Dr. J. E. MacKenty. The ethmoids and sphenoid were opened and a radical operation performed by Dr. MacKenty, who found a purulent sinuitis of low grade.

The corneal precipitates rapidly absorbed and in ten days no traces of the ocular process could be discovered. There has been some difficulty in this case in keeping the sinus open as the bony tissue proliferates rapidly. If the sinus drainage becomes defective, a few floating spots appear in the vitreous or a few corneal precipitates appear. Proper drainage of the sinuses is at once followed by a clearing up of the ocular symptoms. His vision is now 20/15 in each eye.

CASE 2. Mrs. S. 60, presented herself for treatment May 7, 1920. An iridectomy for glaucoma had been done five weeks previously in the right eye and a week later in the left. Both eyes were red and inflamed, the left slightly worse. T. R. 23, L. 31 (Schiötz). R. V. = 20/40; L. V. = 20/100. The vitreous in each eye was full of fine dusty opacities, the left being worse than the right. Fields were normal. Wassermann negative, teeth negative by X-rays, general examination showed only a slight heart murmur with good compensation. X-rays showed some slight bony changes in the region of the sphenoid. Nasal examination by Dr. J. E. MacKenty showed that the left ethmoids were not well open.

She was treated with pilocarpin and dionin, and vaccines were made from a streptococcus which was found by culture taken from the ethmoids. She was also given iodid of potassium. The ocular conditions remained unchanged and on June 11th the tonometer readings were R. 25, L. 35. June 14th, Dr. MacKenty opened the ethmoids and sphenoid and found nothing. The following day the congestion of the eyeballs had markedly decreased and on June 21st, R. V. = 15/15 —; L. V. 15/20 W — .50 cy. ax. 90°. Ton. Rt. 22. L. 25. July 13th, the vitreous opacities had gone and tension was normal, which it has remained ever since. The vision is now R. 20/15 — with — 0.25 ⌒ — 0.50 cy. ax. 75°. L. 20/20 — with — 0.50 ⌒ — 1.25 cy. ax. 75°. A few lens opacities remain. T. R. 20, L. 22.

CASE. 3. C. Male, 19. While taking college examinations noticed that a spot had appeared in the left eye and that the letters appeared distorted. Two days later, Jan. 14, 1921, he presented himself for treatment. R. V. = 20/15 with

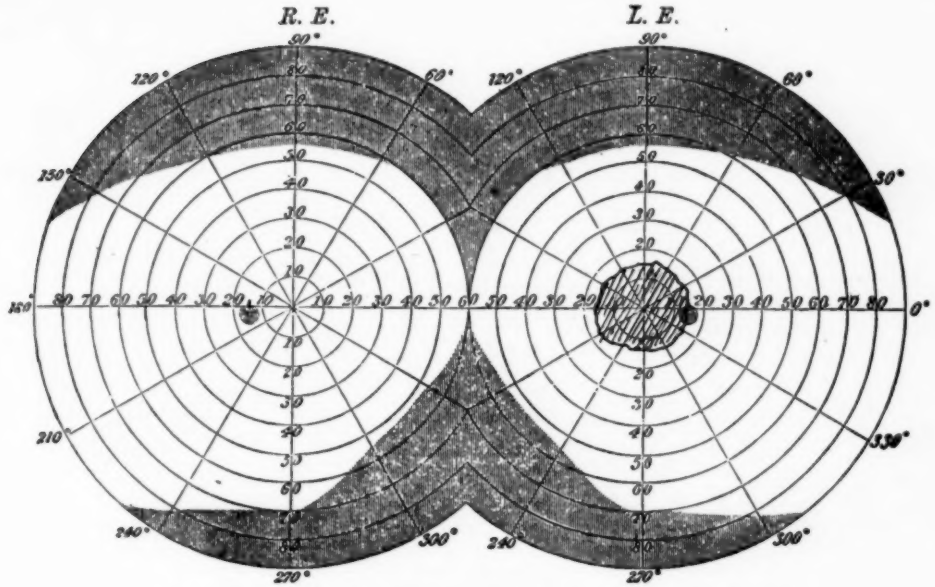

Fig. 1.—Relative central scotoma. L. E. Case 3. January 14, 1921.

+ 0.37 cy. ax. 105°. L. V. 20/40 — with + 0.50 cy. ax. 90°. There was a small partial central scotoma in the left eye with defective color perception. Green was particularly bad, altho red was also affected. The following day the sphenoid was opened by Dr. Stuart L. Craig. No evidences of sinus disease were found. Two days later the colors were almost restored and V. = 20/15. Jan. 25th, last seen, colors normal, vision 20/15, scotoma entirely gone.

CASE. 4. W. Male, 67, presented himself Jan. 20, 1921, with a color scotoma in the right eye which had been pres-

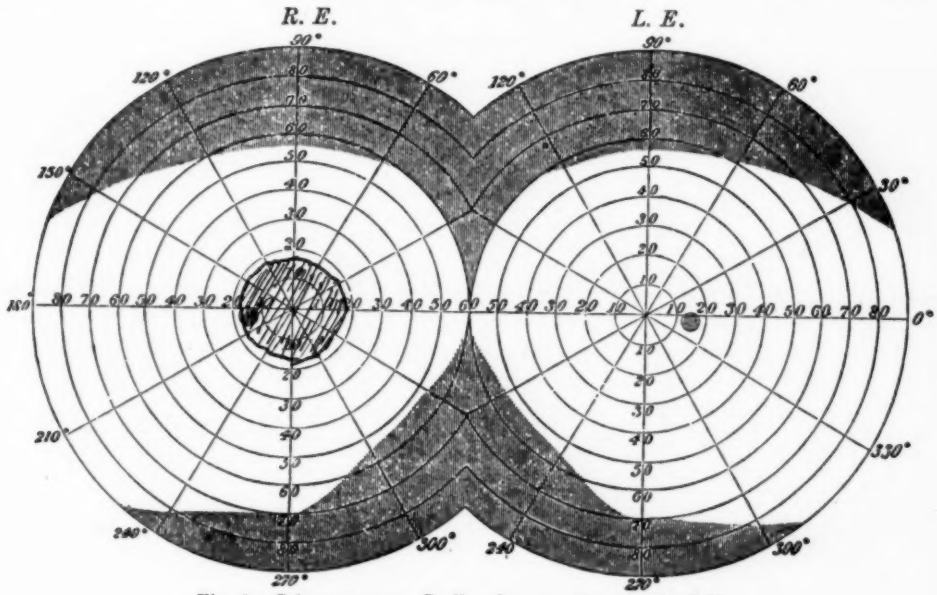

Fig. 2.—Color scotoma. R. E. Case 4. January 20, 1921.

ent two weeks. R. V. = 20/50, with his glass. L. V. = 20/15, with his glass. No ophthalmoscopic findings. General health good. Several teeth with apical abscesses. Jan. 26th, the sphenoid was opened by Dr. MacKenty. No evidences of disease found. Jan. 29th, R. V. = 20/20 —. Jan. 31, R. V. = 20/15 — with his glass. Colors normal, scotoma gone.

CASE. 5. L. female, 18, presented herself Jan. 30, 1921. There was no perception of light in the left eye. R. V. 20/15. No ophthalmoscopic findings, and general examinations negative. X-rays showed perhaps slight increase in density near the posterior ethmoids. No direct reaction of the pupil. The conditions had been discovered a few days before, but vision had undoubtedly been failing for some days. Nasal examination negative. Feb. 7, a radical ethmoid and sphenoid operation was done by Dr. S. McCullagh. Two days later L. V. = 20/200. and a central color scotoma could be demonstrated. The vision has gradually improved since then until at the last observation, Feb. 28th, vision was 20/20, colors normal, scotoma had disappeared.

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OCULAR DISEASES OF NASAL ORIGIN.

JAMES ALLEN PATTERSON, M.D.

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This account deals especially with follicular conjunctivitis, phlyctenular conjunctivitis and keratitis, orbital cellulitis and inflammatory involvement of the deeper tunics of the eye. Cavernous sinus thrombosis is also referred to. Read before the Western Section of the American Laryngological, Rhinological and Otological Society, Colorado Springs, Feb. 26, 1921.

It is a pleasure to me to know that interest in the subject of this paper is one which the Laryngologists have at last awakened to. The title of this paper is an exact repetition of one prepared for this Society in 1907, and published in OPHTHALMOLOGY for July of that year.

I shall classify the subject as follows:

Diseases of the nose in their causative relation to (1). External ocular diseases. (2). Orbital affections, and (3). Diseases of the deeper tunics and optic nerve, as well as of the cavernous sinus.

An ordinary chronic conjunctivitis is usually caused by some morbid condition within the nose. Dr. J. Solis-Cohen tells us of such an example in his friend, the late Dr. Harrison Allen, of Philadelphia, who suffered from this annoyance. Solis-Cohen frequently told him that if he would allow him to treat his nose he would cure the conjunctivitis. After being ridiculed for such ideas for a long time, Dr. Allen permitted Dr. Solis-Cohen to treat him. The subsequent cure so charmed the patient that he took up laryngology and became an eminent practitioner of that specialty.

Chronic conjunctivitis is frequently kept up by diseased conditions of the lacrimal passages wherein lack of drainage is acting as an irritant and reinfection from the lacrimal sac constantly taking place. Furthermore diseases of the lacrimal apparatus are in the great majority of cases due to an extension of morbid conditions within the nose. Indirectly hyperplastic ethmoiditis wherein the nasal secretion in the early stages is abundant and subsequently becomes lessened in quantity, but more tenacious in consistence, is a prolific cause, because the patient gets into the habit of dislodging this discharge by violent blowing of the nose carrying the infection into the lower opening of the lacrimal passages so that slow invasion of the lumen takes place, similar to that which occurs in the Eustachian tube and middle ear.

If you will examine the skull you will sometimes find a large ethmoid cell lying just behind the groove in which rests the lacrimal sac. Now the thin wall which divides them as well as their proximity, occasionally allows infection of the lacrimal sac to take place by this direct route. I have found a communicating passage between this cell and the lacrimal sac on more than one occasion when I have opened into the lacrimal sac from the nose to drain it for the cure of chronic dacryocystitis.

De Schweinitz[2] aptly remarks "altho it might seem natural that conjunctivitis should cause lacrimal disease this is by no means frequently the case. Conjunctivitis and blepharitis so often accompanying disorders follow rather than cause lacrimal affections. Donald Gunn thinks that the cause of mucocele of newborn children becoming afterward dacryocystitis depends upon a dilated duct, the dilatation being brought about during fetal life by obstruction of the lower end depending upon some developmental fault."

Jackson believes the stillicidium seen in young infants to be due to nondevelopment of the lumen of the duct. In many instances I have found it due to a stoppage of the lower lumen from vaginal or other foreign secretion. It most frequently disappears by treatment of the nasal end of the duct.

Follicular conjunctivitis, a disease which may be confused with trachoma, is considered to be caused by malnutrition, and its management improved by tonics, good hygiene and glasses. It is a rebellious malady and occurs at the time that the adenoid tissue of the body

is at its greatest activity, as Parsons[3] aptly phrases it "A pathologically allied condition."

Removing offending tonsils and adenoids, particularly the latter, gives aid to any tonic and hygenic treatment which may be carried out. Correcting refractive errors which lessens congestion and irritation of the conjunctival sac is an adjuvant not to be forgotten. Jervey[4] shows by his recent reports the consequences of confusing trachoma with this simple affection. The serious aspect of this affair is that "many school children may be stigmatized as having a disease, notoriously of uncleanliness, and will be practically compelled to submit to an operation that alone could not possibly cure them if they have malignant trachoma, and while if they have not trachoma is obviously useless and certainly not without danger to the integrity of their eyes."

Phlyctenular conjunctivitis and keratitis are usually associated with mucopurulent secretion from the nose, nasal stenosis and ulcerations about the alae nasi. In no affection do I know of such prompt cure as is occasioned by the removal of the tonsils and adenoids. This disease was treated for years by tonics, fresh air and allied hygienic methods. As I have remarked in previous essays it is a disease of much less frequency in Colorado than in the damp regions to the East and South of us. There its outbursts coincide with the moist warm days of early spring.

I have detailed in a former paper cases of unilateral lacrimation, photophobia and sometimes pain promptly relieved by draining the ethmoid labyrinth, also cases of uveitis and keratitis due to sinus affections which subsided under such treatment.

The most violent forms of *orbital cellulitis* are dependent upon facial erysipelas. It occurs from scarlet fever, typhoid and influenza, but it is most frequently caused by diseases of the accessory nasal sinuses. Birch-Hirschfeld[6] estimates the ratio as 60%. It is commonly seen in cases where pus has broken thru the thin ethmoid plate of the orbit or has eroded the floor of the frontal sinus above the eye.

I related before you last winter a case in which pus had entered the orbit from the maxillary antrum below it. This occurred in a very young child. Last spring I showed before our County Society a case in which there was not only pus in the orbit but a paralysis of the superior oblique; the infection being due to an acute frontal sinus empyema which was relieved without scar by the Lothrop operation.

Deeper Tunics of the Eye. Concerning the involvements of the deeper tunics of the eye; occasionally we find hemorrhagic retinitis, seldom choroiditis excepting from lues, from nasal disorders.

In 1905 I made a study of the relationship of nasal disorders to vitreous opacities,[7] collecting twenty-five cases. From this study I deduced "that the ordinary nonspecific hyalitis is a result of a cyclitis of a low grade of activity, produced not only in myopic eyes by the systemic diseases mentioned by Hill Griffith but that diseases of the middle meatus of the nose in which there is imperfect drainage are liable in some instances to be a causative factor."

It has been my observation that diseases of the optic nerve, sometimes a papillitis, more frequently a retrobulbar neuritis, are due to causes located in the posterior ethmoid cells and sphenoid cavity. I marvel at the immunity which the eye maintains to diseases of the frontal sinus, no doubt due to its more perfect drainage naturally, or by means employed by the rhinologists in shrinking the tissues about the frontal duct; the severe pain of the acute onset compelling the patient to seek relief and the location of the pain making the diagnosis easier.

While the sphenoid cavity is far back and guarded in front from common nasal affections when its protecting barriers are disturbed and it becomes diseased by the proximity of the posterior ethmoid cells, its drainage is seriously interfered with or entirely blocked. We then have a cell with a small opening and hard bony walls with pus or secretion sometimes under pressure within it; there then occurs an effort to drain in the line of least resistance and that is toward the optic foramen. If you will examine anatomically you will notice that the bone making the outer wall of the

sphenoid cavity, tho hard, is so thin that by transillumination you can readily see the outlines and movements of any small dark object held between this thin bone and the optic foramen.

It is therefore no wonder that the optic nerve suffers when infection is held in this tight walled cell, and since retrobulbar optic nerve conditions are not always visible by the ophthalmoscope even when sight has declined beyond the hope of recovery, it behooves the ophthalmologist to search promptly and persistently by methods of known worth to make an early diagnosis.

This brings us up to the use of the perimeter and perimetric methods of diagnosis. I looked forward to being able to diagnose more easily the retrobulbar conditions due to sinus affections as distinguished from other toxic causes when van der Hoeve and others claimed that the enlargement of the blind spot upon the perimeter chart was diagnostic of sphenoid disease. Unfortunately this fact has been most disappointing altho it has led to further investigations showing that central and paracentral scotomas are valuable aids. It is not within the scope of this paper to go into the perimetric diagnosis of disease but it is to warn you that many men claiming ophthalmology as a specialty not only do not possess a perimeter but are also almost totally incompetent to use it for diagnostic purposes.

Examination of the eye ground and of the optic nerve is ofttimes of little value diagnostically unless used in conjunction with other refined methods of diagnosis.

Both ophthalmologists and rhinologists have at last reached the point where when in doubt as to the cause of optic nerve disturbances, other diagnostic methods such as X-ray of teeth and sinuses, Wassermann and other examinations of the blood proving negative, they advocate operation within the ethmoid and sphenoid areas, and I want to urge you not to delay. I should rather operate too soon than to wait too long for X-ray and blood tests to be completed, particularly if rapid loss of sight is taking place or pain and mental conditions are present, because it is astonishing how diseases in this area are prone to disturb the mentality of the individual to such an extent as in many cases to be of great value in diagnosis. I want to impress upon you the value of studying any changed attitude in the mentality of the individual.

Cavernous Sinus Thrombosis. This is liable to occur from lesions drained by the ophthalmic vein or its branches. De Schweinitz[2] enumerates pustules on the face, nostrils or eyelids, or from purulent affections of the accessory sinus and rhinopharynx and from erysipelas and wounds.

He quotes St. Clair Thompson as stating that next to the sphenoid diseases pyogenic affections of the ear are the most common causes. Treatment is drainage thru the sphenoid and I hope we may have some discussion of these operations. I certainly believe that where thrombosis is threatened or suspected an early exenteration of the ethmoids and breaking into the sphenoid sinus is warranted in the hopes that depletion and possibly drainage may have a favorable influence. The terrible fatality sure to follow thrombosis warrants such procedures. Attention to the primary cause is of course not to be neglected.

The following illustrative cases have been seen within the past month:

1. Mrs. L. Ulcerative keratitis, with chronic uveitis. A radical operation upon the antrum, double exenteration of the ethmoids with drainage of the sphenoids, relieved pain and inflammation almost immediately.

2. Mrs. B. Vitreous opacities in both eyes due to chronic lacunar tonsillitis. Tonsillectomy performed.

3. Mr. J. Vitreous opacities in both eyes due to chronic ethmoiditis, with much sticky secretion in nose and pharynx. Operation refused.

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TUBERCULAR INFECTION AS A CAUSE OF DELAYED HEALING IN OPERATIONS ON THE EYE.

EDWIN B. MILLER, M.D.

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The influence of tuberculosis in delaying the healing of operative wounds is illustrated in cases here reported. The good effect of specific treatment in removing this unfavorable influence is also shown.

Some years ago while working in the clinic of Dr. S. D. Risley at the Wills Hospital, an Italian fruit dealer of robust constitution, who was suffering from glaucoma simplex came under our care. Dr. Risley performed the usual broad iridectomy. A few days after the operation the man presented a low grade iridocyclitis, which, under appropriate treatment largely cleared up. There still remained, however, an irritable eye. On close examination, it was discovered that his cornea was studded with small islands of gray infiltrate which resisted all treatment. Thinking that there might be a tubercular infection, a von Pirquet was made and it proved to be strongly positive. The man was placed on tuberculin treatment and in a short time the eye became quiet and no further trouble was experienced by the patient. This case was shown before the Wills Hospital Society and reported by Dr. Risley.

I wish to present two cases which are types of a number that I have seen. On September 23, 1920, S. S. H., age 30, carpenter by trade, was referred to me by Dr. R. T. Downs, of Riverside, N. J. The patient was admitted to the Polyclinic Hospital, Philadelphia, at eight P. M. and I saw him at nine P. M. The history is as follows:

On the afternoon of the above date, a chisel, which he was using flew out of his hand striking his glasses and breaking them. A piece of the glass cut entirely thru his left eye beginning 6 mm. on the cornea inside the limbus at three o'clock, thru cornea, ciliary body and sclera straight back over the site of the external rectus muscle for about 8 mm. The iris protruded and farther back a large bead of vitreous presented.

Under local anesthesia, I cut off the prolapsed iris, replaced the pillars and cut off the bead of vitreous. I attempted to stitch the sclera together, but each time I tried to put the needle in the sclera, more vitreous was squeezed out. I then made a large conjunctival flap and covered the entire wound, stitching the margins of the flap with three sutures to the conjunctiva on the nasal side; one drop of a 1% solution of atropin was instilled with one drop of a 25% solution of argyol; a bandage was applied and constant ice compresses were ordered.

The patient remained in bed for two weeks and in the hospital for three weeks. On the third day as the conjunctival stitches had sloughed out, allowing the conjunctiva to retract, I noticed on his cornea two abrasions, which appeared to be infected, one about 2 mm. in diameter at seven o'clock just inside the limbus and one about 3 mm. in diameter at six o'clock, 3 mm. in from the limbus. They were probably made by the splinters of glass. I instilled holocain and touched them with pure trichloracetic acid.

When the conjunctiva had entirely retracted, I found the wound nicely approximated; the anterior chamber had reformed; these abrasions, however, did not heal but became more extensive and between them and from the limbus below vascularization appeared. I used iodin, iodoform, calomel and in the office later, permanganat of potash, the actual cautery and pasteurization with a Prince pasteurizer, but they persisted. I began to be fearful lest I should have a perforation. I called Dr. Luther C. Peter in consultation and we studied the case together, deciding to continue the application of iodin and pasteurization. Up to November 17, nearly two months after the original injury, there was no improvement in the ulcers, the wound and the rest of the cornea having entirely healed, but the eye was intensely red.

On close examination with a loupe, these areas had an appearance similar to those seen in tubercular ulcers of the cornea, so I made a von Pirquet which was strongly positive. Then I began the administration of Koch's old tuberculin, by the method which I presented at the Pennsylvania State Medical Society in 1919, beginning with 1/1000 mg.; almost immediately the ulcerated areas began to clear and after a period of two months the eye was nearly quiet; during this time sixteen injections were given, the last being ⅛ mg.

The patient's vision at this time was right eye 20/40 and in the injured left eye 20/40? He has a refractive error which was corrected as follows: R. +0.75 ⌒ +1.00 cy. ax. 80° = 20/20. L. +1.50 cy. ax. 135° = 20/30.

Case 2. R. E. C., 39 years old, drug salesman. Family history. The patient is one of six children, four of whom have good eyes, one brother has congenital dislocation of both lenses. The right eye became inflamed (cause unknown) and was removed at Wills Hospital. His mother had an attack of iritis, which cleared up under treatment. She died of stomach trouble. The patient has three children, one a girl with perfect vision, a girl age eleven, with congenital dislocation of both lenses, upward, behind the iris, a boy who had congenital dislocation of both lenses, upon whom several needling operations have been performed at Wills Hospital but with poor success; he is at present at Overbrook school for the blind. Previous history. The patient never had any serious illness. He says he never had eye trouble until after a slight attack of gonorrhea, at eighteen years of age, but vision was always poor. Present history. The patient came to my office, February 6, 1920, with a very sore left eye; he had been under the care of a competent oculist for some time. During the last few years he had been examined and treated for inflamed eyes by a number of prominent Philadelphia oculists.

Present condition. The patient is tall, thin and dark complexioned, much under weight, with dry hair and skin, his flesh is flabby and he appears weak and much run down.

Eye examination. O. D. Cornea clear, anterior chamber deep, iris tremulous, partial dislocation of the lens downward behind the iris, pupil irregularly round, 5 mm., does not respond to light or accommodation, ocular movements full in all directions. Vision O. D. Without glasses 6/200, with the addition of a +5.00 spherical = 20/100. Ophthalmoscopic examination. O. D. Media clear, disc small, round, slightly pale, margins well defined, vessels small, slightly tortuous, macula and periphery negative. The right eye was always the poorest eye. O. S. Shadows at 1 ft., intense blepharospasm, photophobia, lacrimation, intense congestion of bulbar and tarsal conjunctiva, more marked at the limbus below. There was a circular area on the cornea, four millimeters in diameter, just above the limbus at six o'clock, which has a ground glass appearance. With a loupe this area had the appearance of minute nests of exudate surrounded by a halo of infiltration. The anterior chamber was deep, the pupil dilated with atropin by previous oculist, the iris was tremulous, the lens was opaque and was completely dislocated into the anterior chamber below, touching the inflamed area at the limbus and the upper margin tilted back into the pupillary area.

Ophthalmoscopic examination. No view of the fundus was obtainable, tho there was a dull red reflex at the upper edge of the dislocated lens.

Wassermann examination, negative, von Pirquet was strongly positive. I put him on desiccated sheep's thyroid gr. 1. t.i.d., instilled one drop of a 1% solution of atropin, t.i.d., one drop of a 5% solution of dionin, t.i.d., hot compresses every three hours, for fifteen minutes and began the administration of Koch's old tuberculin at four day intervals, beginning 1/1000 mg. and running up to 1/60 mg. This was followed by rapid improvement in his general condition, and he said he felt like a new man; his corneal condition rapidly cleared up except at the lower limbus. I attributed this to a quiet cyclitis caused by the presence of the

lens acting as a foreign body, so I determined to remove the lens.

On April 25, I admitted him to the Polyclinic Hospital and on the 26th, under narco and cocain anesthesia, removed the lens without difficulty, thru an upper corneal incision. The lens was very hard, almost round and yellow in color. There was very little reaction. He left the hospital in a week and I resumed the tuberculin treatment in the office, running it up to 1 mg. The eye became quiet and the patient could attend to his duties as a salesman without discomfort. There was no visual improvement in this eye because of the opacities of the cornea and the extreme cloudiness of the vitreous.

CONCLUSIONS: After the most painstaking care in preparation, operation and treatment, we all have cases which do not do well and have irritable eyes. Might not these conditions be due to some bacterial focal infection? I believe that in the cases just cited, tubercular infection was the cause of the delayed healing, and report these cases with the hope that it may be of interest to others.

NOTES, CASES AND INSTRUMENTS

MARGINAL VESICULAR KERATITIS.

HARRY S. GRADLE, M.D.

CHICAGO, ILLINOIS.

An interesting case is that of a woman of forty who has been under observation for the past year and a half. About a year ago, Dr. E. Jackson saw her and was no more able to put a name to the disease than I was. Because of inability to classify, I have called it "Keratitis Marginalis Vesiculosa."

Miss W. R., June 8, 1920. Left eye. Vision poor since childhood; present trouble with left eye of 8 years duration and has been uneventful, except for a corneal ulceration about 2 years ago. There have been blisters on the right eye some six to eight weeks. Right eye. Very slight conjunctival injection in inferior nasal quadrant. Concentric to the limbus and 1 mm. therefrom is a band of opacity 2 mms. wide extending from meridian 0 to meridian 270°. Between the limbus proper and this gray band is a 1 mm. strip of clear and normal cornea, except for superficial vessels. The corneal margin of the gray band is sharply demarcated and is concentric to the limbus. The band is covered with an unbroken epithelium that is irregularly raised; and immediately under this are innumerable vessels that pass from the conjunctiva over the clear corneal area to the gray band. These vessels show no abnormality or peculiarity, beyond extensive ramification and a very abrupt change in course at the inner margin of the gray band. At meridian 330° the epithelium over the gray area is elevated into a bleb 2 x 3 mm. in size, parallel to the limbus and 1 mm. high. The covering of the bleb is pure epithelium, thru which course the large vessels of conjunctival origin. The tissue underneath the bleb is normal. On evacuating the bleb of the perfectly clear fluid that it contained, the epithelial cover sank back into place without a wrinkle. The opacity of the gray band extended about ⅔ into the depths of the cornea and under the slit lamp was found to be a perfectly homogeneous opacity of the corneal stroma, with complete obliteration of the lymph spaces. The remainder of the cornea was normal as were the other parts of the eyeball.

The left eye was pale. The entire lower ⅔ of the cornea was involved in the similar gray process, that was found in the beginning stage in the right eye. The surface of the cornea was unbroken, but very uneven, bearing more resemblance to a contour map of a foot hill country than anything else. The slit lamp showed no irregularities of the corneal epithelium. Vessels were not as numerous as in the right eye, but were larger and bore deeper into the depths of the cornea with fewer anastomoses. The marginal loops of the conjunctival vessels at the limbus showed many microscopic dilatations of an aneurysmal type. The stroma of the cornea showed a more or less uniform gray opacity with complete elimination of the lymph spaces. Corneal nerves were nowhere visible. Toward the upper clear portion of the cornea, the opacity became thinner and gradually faded into clear and normal substance, without any microscopic line of demarcation. In the lower inner quadrant of the cornea, some three mm. from the limbus, and located very deep, probably in the posterior quarter, was an irregular shaped 2 mm. area of dense opacity that seemed like a calcareous deposit similar to the type seen in Axenfeld's "Calcareous Band Opacity of the Cornea." This was so covered with semiopaque corneal tissue that details could not be discerned.

Thru the clear portion of the cornea, about one-fourth of the iris could be seen. This presented no abnormality beyond several anomalously dilated crypts. As far as could be told, the remainder of the eyeball was normal.

Many infected tooth roots were found and the general condition of the mouth was bad. All the teeth were removed; but this had no influence upon either eye. General physical examination revealed no pathology.

She was given 5% dionin, the use of which seemed to cause a slight thinning

in the opacity of the left cornea. This was later combined with fibrolysin without any noticeable influence. During the past year and a half, several blebs have appeared at different times at the ends of the band in the right eye and upon their disappearance have left behind an increase in the size of the band and added irregularity of the corneal surface.

This picture is somewhat unusual, but is rather complete, the beginning stage being represented in the right eye and the terminal stage in the left eye. From some unknown cause, the epithelium of the cornea, at first a short distance from the limbus, forms a bleb and subsequently, this disturbed epithelium becomes vascularized from the neighboring conjunctiva. In all probability the bleb does not rupture, but its contents are simply absorbed. The undisturbed epithelium as seen by the slit-lamp speaks against any solution of continuity. The disappearance of the bleb is followed by the uniform opacity of the underlying cornea, probably due to toxins of the vesicular contents. The process repeats and the opacity increases in size. The cause cannot be determined; but the eventual outcome is loss of vision, unless the process can be checked.

PRIMARY EPITHELIOMA OF THE CORNEA WITH TREATMENT.

REX DUNCAN, M.D.

LOS ANGELES, CALIFORNIA

The following case is of particular interest; first, because of the rarity of primary malignant growths of the cornea; second, because it demonstrates the feasibility of exposing the eye to fairly large doses of radium without injurious effect; and third, because of the most excellent result obtained in this case.

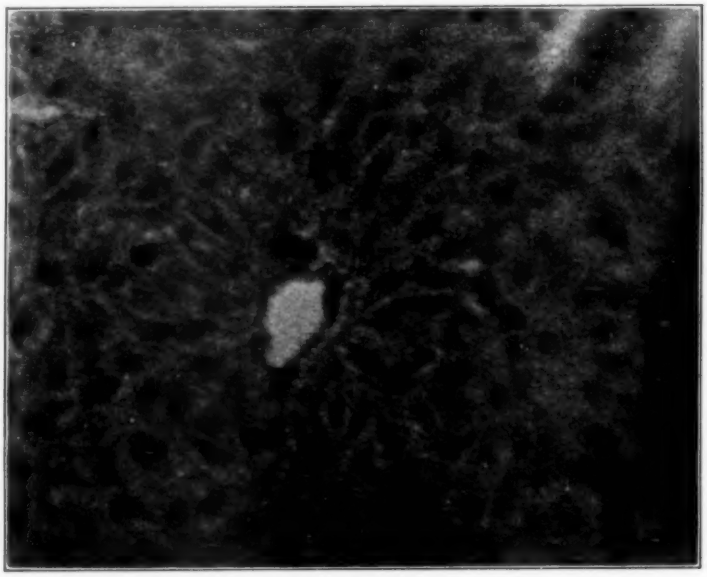

Fig. 1.—Section of corneal growth composed chiefly of epithelial cells, some arranged concentrically. Diagnosis epithelioma.

W. E. K. Case No. 1094. Male, Age 60. Occupation, Stationary Engineer. Referred to me May 20, 1919 by Dr. Frank W. Miller, whose report is as follows:

"W. E. K. reported May 15, 1919, that he had noticed a small red spot in the left eye, dating back probably three months. This spot became elevated and gradually increased in size. There was no pain nor distress except mild conjunctional irritative symptoms. On examination a small pediculated and partly movable, spherical growth, 3 mm. in diameter, was found at the inner corneal limbus. This growth was thoroly re-

moved and a small funnel shaped opening was left, deep in the tissues. (See Dr. Hill's report.) Patient was immediately sent to Dr. Rex Duncan for Radium treatment. At the present time two years after treatment, there has been no recurrence. The scar is soft and small and he has a perfectly functioning eye."

Pathological examination of the tissues removed was made by Dr. R. B. Hill, whose report is as follows:

"The specimen is a small piece of tissue about the size of a split pea. Sections show it to be made up almost entirely of epithelial cells, which are fairly uniform in size and shape; they are for the most part squamous in type and take the stain deeply. Many of them show mitotic figures. In places the cells are concentrically arranged, suggesting "pearl" formation. There is a very scant connective tissue stroma (See Figure 1).

Diagnosis: Epithelioma.

Radium treatment was given as follows: Five days following the excision an applicator consisting of a tube of 100 millicuries of radium emanation, screened with 0.5 mm. of platinum; 1 mm. of pure rubber gum tubing, was applied directly over the wound and retained in position one hour. Four such applications were made, totaling 400 millicurie hours. The eye was thoroly cocainized preceding each application and the eye lids separated in such a manner as to protect them from the rays. A few days following treatment there resulted some mild inflammatory reaction, which gradually subsided during the following four weeks leaving the eye apparently normal.

This case has been seen frequently by Dr. Miller and myself and there is apparently a perfect result.

A RECORDING SCOTOMETER.

E. O. Marks, M.D.

BRISBANE, AUSTRALIA.

The desire to combine the advantages of the Bjerrum screen and the registering perimeter has given rise to several modifications of the Bjerrum screen with which the writer is acquainted. So far as he is aware the device now put forward has not previously been utilised. None of the instruments in use appear to be entirely automatic—either concentric circles or meridians or both requiring to be read off and marked on the chart, or noted and later plotted on the chart. Moreover the instruments all work in circles or meridians a feature which usually shows itself in the peculiar outlines of the scotomata as charted, and is a handicap in following the outline of a scotomata when under investigation.

The present instrument, which is really a recording attachment for a Bjerrum screen, has been designed to obviate these defects by providing a test object which moves freely about the field in any direction while providing a means of automatically recording on a chart the position of the test object in reference to the fixation point.

It has been constructed to a scale to suit the ordinary Bjerrum curtain, and at a working distance of one meter can record to beyond the 30 degrees circle on a chart 8 inches square. By using charts drawn to corresponding scales the same instrument could if desired be used for other working distances. It has been designed for a curtain 15 meters square, but the same device could be utilized for smaller or larger instruments.

The mechanical principle adopted is that familiar to draughtsmen in the reducing instrument known as the pantagraph. It is both simple and mathematically exact in theory. Any error that occurs must be due to faulty construction or use, or to that predominant factor in any subjective examination—the patient.

The instrument consists of a suitable base from which springs a vertical standard to a height of six feet. Supported by a bracket and a round hole in the top of the standard, a rod projects horizontally six feet and has attached to it the black velveteen curtain. By pushing the rod horizontally thru the hole in the standard, or by twisting it in the manner of a roller blind the position of the curtain (and fixation object) may be adjusted to the rest of the instrument. Attached to the standard, 4 feet

from the floor and on the same side as the curtain a board holds the chart, by means of suitable slots into which the chart is slipped into position.

The moving part of the instrument is suspended on a pivot to the standard on a level with the chart. It consists of two parallelograms and a pointer. The larger parallelogram and the pointer (which is continuous with a short side of the parallelogram) form the essential portion of the instrument, the smaller parallelogram serving merely to carry a balance weight. They are constructed of thin wooden laths, the bearings and pencil holder being of metal. The dimensions which have been adopted merely for the sake of obtaining a suitable range of movement and magnitude of chart give a reduction of 7:1 and are, between centers,

Long side of parallelogram 3 ft. 6 ins.
Short side of parallelogram 6 ins.
Pointer from test object to near bearing 3 ft.
Pencil from bearing 6 ins.

The *pointer*, if simply straight, would in some positions obscure the fixation point. To obviate this it has been given a double elbow and is capable of turning on its long axis. It is covered with the same black velveteen as the curtain and provided with a test object on each side. The test objects, white and colored, are on black velveteen covering a clip which slips on the end of the pointer.

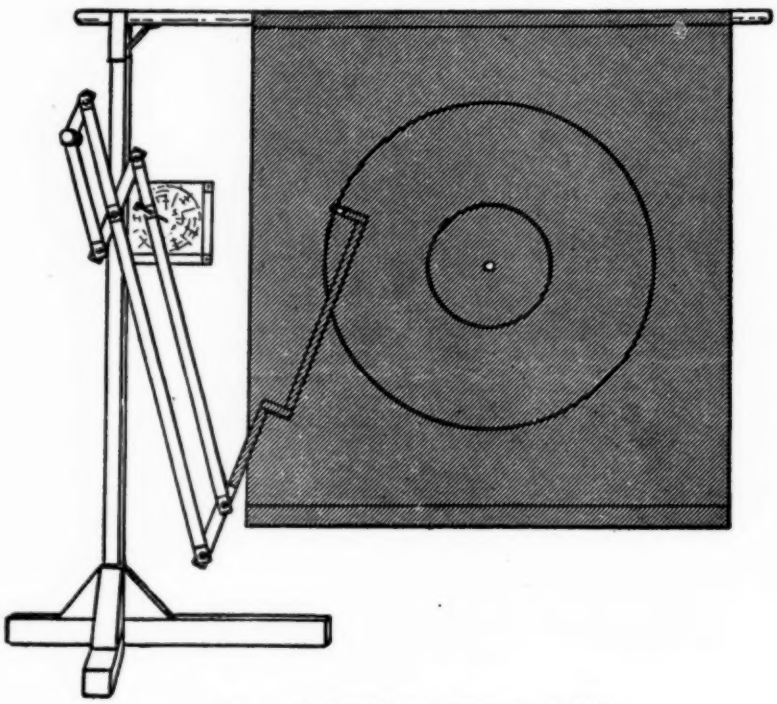

Fig. 1.—A Recording Scotometer. (Marks).

The *pencil holder* is merely a short tube thru which the pencil may be pressed against the chart whenever it is desired to record the position of the test object.

In the board supporting the chart is a small hole, corresponding to the position of the centre of the chart. This takes the wire centre of a "dummy" pencil, and serves to hold the instrument in the central position while the curtain is adjusted so that the fixation point and test object coincide.

The whole instrument might conveniently be arranged as a wall fixture and provided with electric illumination.

The chart has been printed to show (on tangent scale) the concentric circles at 5 degrees intervals up to 30 degrees and meridians at 30 degree intervals.

On the curtain the 10 degrees and 25 degrees circles have been marked in black silk, in deference to Priestley Smith's opinion of their diagnostic importance, and to act as a check on the accuracy of the instrument.

PARALYSIS OF DIVERGENCE, AND ABSENCE OF EXTERNUS

WALLACE RALSTON, M.D.
AND
EVERETT L. GOAR, M.D.
HOUSTON, TEXAS.

CASE 1. *Paralysis of Divergence.* H. R., age 41, detective, Sept. 15, 1920, while driving a car, suddenly noticed that distant objects appeared double. An approaching automobile, while at a distance, appeared like two cars, which, when almost upon him, merged into one. Since that time, he has had double vision, and complains of a "puckering sensation" in his forehead and about his eyes after being up one to two hours. He has been in good health, has never had any severe illness, and denies any venereal infection.

When first seen by us Jan. 10, 1921, examination revealed the following: V. R. 20/20-2. L. 20/20. Cycloplegic ref. R. 0.25 S. ⌒0.50 cyl. ax. 90° = 20/20. L. + 0.50 S.⌒ + 0.50 cyl. ax.90° =20/20. Left pupil, 4½ mm., right 3 mm. Both react rather sluggishly to light, readily to convergence. Near point of convergence 40 mm. Ocular movements normal to excursion test. There is an esotropia of twenty degrees at six meters, with the left eye fixing and right converging. At 25 cm. there is two degrees of esophoria. With red glass and light, there is a homonymous diplopia amounting to twenty-four inches at twenty feet. As light is brought nearer the images approach each other, and there is binocular single vision at 19 cm Tangent screen shows a homonymous diplopia, equal in all fields, except upper and lower, in which it is respectively less and greater. With 14 degrees prism, base out, he can fuse the lights at twenty feet. Blood Wassermann was negative. Urine normal. Blood pressure 130-80. Refused spinal puncture. We insisted upon spinal puncture and this man withdrew from our care. We are informed by a colleague that he is improving on large doses of K. I. and mercury.

CASE 2. *Retraction of Globe. Absence of Externus.* Mrs. C. B. B., aged 34. Chief complaint: eyes burn and hurt after close work. Right eye has been "crossed" since birth. Was one of twin babies, and states that she weighed but two and one half pounds at birth. Was not an instrumental delivery. Examination reveals: V. R. 20/50, Cor. 20/30. L. 20/30, Cor. 20/30. Accepts R.+0.50 cyl. ax 90°. L.+0.50 S.+0.37 cyl. ax. 90°. Has never been troubled with diplopia. The eyes are negative to examination, except for the following interesting muscle condition:

There is total inability to move the right eye outward past the primary position. On adduction there is marked narrowing of the palpebral fissure, with simultaneous retraction of the globe. Near point of convergence is 30 mm. Adduction is normal and there is no tendency to up or down shoot upon adduction of the eye. This case shows but three of the six signs of Duane's syndrome, but all are well marked, and sufficient to justify the diagnosis of congenital absence of the external rectus.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

WILLS HOSPITAL OPHTHALMOLOGICAL SOCIETY.

March 1, 1921.

Dr. Burton Chance, Chairman.

Congenital Hypertropia.

Dr. William Campbell Posey exhibited a case of congenital hypertropia in a young man with marked facial asymmetry, the left side of the face being underdeveloped. With the left eye fixed in the horizontal plane the right eye deviated strongly upward. Downward and outward motion in the right eye was abolished but the eye could be moved downward and inward to a certain extent by the superior oblique. All other movements of both eyes normal. On account of the absence of action of the inferior rectus, transplantation of muscle fibers from the internal and external recti upon the inferior rectus was decided upon. A curvilinear incision parallel to the corneal limbus was made laying bare the insertions of these three muscles. The inferior rectus was found to be absent except for a very rudimentary portion of muscle fibers found at the site of the usual insertion of this muscle into the globe. The lower halves of the externus and internus were sewed into position thru this stump. A free tenotomy of the superior rectus was done. Care was taken to bring the capsule of Tenon forward below as much as possible by double single stitch sutures. Healing was prompt. At the end of two weeks the eyes were on the same horizontal plane, left hyperphoria of ten degrees, esophoria of twenty degrees at five meters (no measurements could be made prior to operation on account of the high degree of the deviations). Refraction: R. —S. 1.00 D. ⌒ + C. 2.25 D. ax. 85 =5/6. L. + S. 0.50 D. ⌒ +C. 0.75 D. ax. 120 =5/5.

Discussion. Dr. William Zentmayer stated that he had seen a similar case at the Polyclinic Hospital last year.

Zonular Keratitis.

Dr. J. Milton Griscom presented a colored woman, aged sixty, who came to the hospital three weeks ago complaining of failing vision in both eyes. The left eye had been useless for a number of years and on admission vision equalled light perception. There was a dense white band composed of somewhat irregular masses of calcareous material located just beneath the epithelium, this band being about five millimeters in width and placed horizontally across the cornea. The cornea above and below was clear but no view of the deeper media was obtained.

The patient stated that vision in the right eye began to fail following an attack of influenza two years ago. On admission there was a thin band of homogeneous infiltrate occupying a zone five millimeters wide at axis 180 degrees, in which, however, there were a number of clear spaces. Vision 20/200. No view of the media or fundus was obtained. Dr. Griscom had planned to do an iridectomy in this eye but was forced to postpone it on account of an attack of bronchitis in the patient.

Discussion. Dr. P. N. K. Schwenk stated that he would be inclined to do an upward iridectomy for optical purposes.

Infantile Glaucoma.

Dr. L. W. Hughes presented for Dr. Burton Chance a child, aged five, who was brought to the Wills Hospital clinic about two years ago with a history of having had an enlarged right eye since birth. The mother stated that at the age of three weeks the child was taken to the Episcopal Hospital in this city where a growth (described as a membrane) was taken off the eye.

Two years ago examination showed the right eye to be markedly enlarged, the external angle and temporal zygoma had an aperture like incompleteness, upper lid margins thickened and drooping, entropion of the upper lid, cornea almost twice the size of that in the fellow eye

and presented a number of blebs, media otherwise clear and view of the fundus unobtainable. Left eye normal as far as could be determined.

At the time the patient was presented the right eye showed marked enlargement, wide palpebral fissure, lids swollen with entropion and trichiasis of the lower. The cornea very much enlarged but clear. There was a thinning of the sclera above. The anterior chamber was of normal depth, pupil somewhat irregular and did not react to light. The child counted fingers at two feet. Media were clear. There was a deep pathologic cupping of the disc which was quite pale. Blood vessels normal caliber. No discreet lesions of fundus seen except the glaucomatous cupping. Left eye normal.

DISCUSSION. Dr. Zentmayer thought the eye should be enucleated soon on account of the danger of rupture. He did not think an iridectomy was indicated.

Dr. Schwenk thought that an enucleation in the near future would tend to equalize the development of the two sides of the face.

Dr. Posey stated that he would do an iridectomy first and if this were unsuccessful he would enucleate.

Congenital Ptosis.

DR. BURTON CHANCE exhibited the following cases:

1. A case of congenital ptosis in a young negro who has, in addition to the drooping of the lids, an inability to look upward, all such efforts bring about sharp convergence of the axes, altho involuntary convergence cannot be attained until fixing object is carried upwards.

2. An instance of high myopia in a woman and her son.

3. A case showing highly glistening, numerous opacities in the vitreous, of the socalled snow-ball type. The woman came to the clinic on the day on which a man was present in whose eyes exactly similar bodies were noticed.

4. The young woman from whose left orbit an angioma was removed several years ago, which case Dr. Chance had reported before the Ophthalmological Society. The patient cannot elevate her brow nor raise her eye. Chance intends to pursue a plan of operative procedure which shall comprise the transplanting of bundles from the frontalis.

Intraocular Blood Pressure.

DR. PIERRE GAUDISSART read a paper reviewing the recent work of French and Belgian ophthalmologists on the above subject. (See p. 500.)

C. S. O'BRIEN,
Secretary.

SOCIÉTÉ D'OPHTALMOLOGIE DE PARIS

Feb. 19, 1921.

Pterygium Operation.

TERSON states that his operation consists essentially of resection of the pterygium followed by a rectangular conjunctival autoplasty with fixation of the sutures to the sclera as high as possible, with autokeratoplasty if necessary.

Fibroma of the Lid.

J. CHAILLOUS presented a patient with a hard circumscribed movable tumor below the skin of the lower lid. It was either a fibroma or a serous cyst. It was transparent to transillumination.

Atypical Familial Retinitis.

POLACK and FROGE showed a mother and two daughters with similar retinal lesions. They were greyish, vascularized hyperplastic areas very similar to those of retinitis proliferans, with round red or orange colored nodules, very vascular, becoming pale on pressure. Wassermann negative.

Retinitis of Pregnancy.

VALUDE and LAVAT presented a woman who had grave general symptoms during pregnancy, accompanied by retinitis. Abortion was followed by rapid amelioration. There remained only a slight arterial hypotension with a few ophthalmoscopic lesions and slight diminution of vision.

Traumatic Exophthalmus.

POULARD and BAILLIART reported a case of traumatic exophthalmus treated by ligation of the two common carotids.

Traumatic Papillary Stasis.

BOLLACK and P. MERIGOT DE TREIGNY reported a case of traumatic papillary stasis.

Pupillary Reflex in the Screech Owl.

ROCHON-DUVIGNEAUD reported on the pupillary reflex in the screech owl.

Atrophy of Optic Nerves.

ABADIE regarded this as cured by cervicodorsal spinal trephining, followed by evacuation of the cerebrospinal fluid. Believing that the cause of the atrophy was the contraction of the retinal arteries, Abadie attempted to prevent this by influencing the vasomotor spinal centers. This he did by trephining in the region of the ciliospinal center, with evacuation of the fluid. In the patient, one eye which still had perception of light was improved, the other was not affected.

DISCUSSION.—Polack thought, that for an operation as dangerous as this, it would be necessary to see the patient before as well as after the operation, and not to be too quick in accepting the cure.

Spontaneous Rupture of Eyeball.

TERRIEN and GOULFIER reported a man of 70. There had been a quick, terrible pain followed by a profuse hemorrhage thru a large corneal rupture. Anatomic examination showed a retrochoroidal hemorrhage which had forced out the contents of the eyeball.

Terson had seen several cases in glaucoma. There is always a weak spot in the cornea which is the origin of a large tear. The cause of the hemorrhage might be a decompression or an active congestion. Enucleation can sometimes be avoided by excision of the extruded tissue.

Diagnosis of Dyschromatopsia.

POLACK and LONGUET say that Daltonism is in reality a trichomatism with lessened perception of green. It is frequent and should be sought for systematically. Holmgren test is insufficient. The color box of Maxwell is necessary. C. L.

BUFFALO OPHTHALMIC CLUB

January 21, 1921.

Glaucoma After Cataract Extraction.

This paper read by Dr. Edward Stieren has been published in full, p. 424.

DISCUSSION.—Dr. Cowper had seen one case of this kind operated on by another member of the society. A year or so later she appeared with a bullous keratitis. It seemed more than a coincidence that bullous keratitis should occur in this particular class of cases, as Dr. Stieren has mentioned. This case he saw was relieved by trephining and has remained comfortable but without much vision on account of a scar on the cornea. Dr. Stieren spoke of the tonometric tension in a case of this kind. He would like to ask if he would consider that an accurate record in view of the altered corneal surface.

Dr. F. Park Lewis. I have this day had a case of glaucoma following combined extraction made some two or three months ago, in which the vision was 20/15. The patient had apparently no difficulty at all until he came to me with vision reduced to 20/200 and discomfort in the eye, and marked increase in tension. I think Dr. Stieren has given a very fair estimate of the published knowledge of the vitreous but we have not begun to touch the end of it. I have made some experiments with animals in which I showed an exfoliated structure. I have one specimen which is like an opening rosebud. There is no question whatever that instead of the vitreous being a mass of fluid in a framework, the vitreous is one of the most highly involved bodies in the eye. I have another specimen from the ox in which the vitreous has not yet unfolded but in which the layers are interlocked and I think I have a third specimen in which can be outlined a series of tubules extending from the back portion of the eye up to within a millimeter of the posterior capsule of the lens in a series of curves, the openings being toward the disk. It evidently is a series of lymphatics which in the clear vitreous are absolutely invisible and are brought out when the reactions of various reagents are applied. I have two human specimens, one of a man who had a glaucoma for which the eye was removed. A web-like membrane extends from the pos-

terior portion of the vitreous to the back portion of the lens and a definite attachment is evident between either the posterior capsule or some structure back of the posterior capsule, occupying a third of the lens tissue. In this specimen is another feature which I think of importance, the optic nerve is swollen to nearly double its regular size. I am under the impression that we are not altogether in the right track in assuming that it is the spaces of Fontana that are chiefly involved. I think Parker is right in assuming that there perhaps are two kinds of glaucoma, one in which the pressure is from behind and in which he believes operative measures on the back portion of the eye are preferable; but I think that occurs more frequently when there is a deep anterior chamber. Another feature that has appealed to me in the study of animals' eyes is the extremely glassy character, from which, of course, the vitreous takes its name, of the posterior capsule. It is only under peculiar conditions that we get the opacity in which there is a definite exfoliation like the leaves of a rosebud.

Dr. A. C. Snell. I have a feeling like Dr. Lewis that glaucoma following cataract extraction is not so rare. At the present moment I have two patients who are suffering from glaucoma following cataract extraction. At the time of the operation everything went along smoothly, but the patients developed nausea and vomiting. There was a low grade iritis, without exudate on the capsule and glaucoma following rather early. In one case the glaucoma was noticed in three months and in the other in one month. In one case I did an Elliot which was a failure and in the second I did a Lagrange and this was a failure. Vision was 10/200. I then did a posterior sclerotomy with temporary improvement. I have two other cases which are of a different type, in which we had a very favorable result following a period of three years. I did a Lagrange in the first place followed by disaster. In fact the primary vision of 20/60 went down after the operation and never became better than 10/200. We did a cataract extraction on the other eye with a good result. In a woman of the same type I decided to stick to miotics and in a period of over three years the tension has never been very high. It ranges from 25 to 30 mm. Hg. and occasionally a little higher, but she has lost no vision. In considering the etiology of these cases I believed that we always had an iritis, and that our glaucoma was due to the blocking of the spaces of Fontana.

Dr. A. G. Bennett. I have unfortunately seen a few cases following extraction and I have one on hand now which I operated on last week: a comparatively young woman of 42 on whom the operation was done more for the appearance than the idea of obtaining any vision. She had had the cataract since childhood. I did the operation without iridectomy and she went to her bed with a clear pupil. I used atropin in her eye once a day for the week she was in the hospital. I then allowed her to go home with a shade and ordered atropin once a day. At home she used it three times a day and the next day she came with a typical glaucoma. I used eserin and she responded to miotics. There was no debris in the anterior chamber, but there was a little loss of vitreous. I agree with Dr. Stieren that these probably are due to the vitreous plugging up the spaces of Fontana.

I have had in my experience about half a dozen cases of glaucoma following extraction. I rarely do an iridectomy. However, in one case in which I had glaucoma I did the combined extraction. He, however, recovered under eserin. In two of my cases I had a bullous keratitis.

Dr. H. M. Weed. I recall two cases of glaucoma both of them in elderly women. The first operation was done by the combined method. Both had good vision following the operation. This first case I did not see for some time afterwards. She returned with one eye blind. This all happened perhaps ten years ago. She still had good vision in the unaffected eye. The second case was also an elderly woman from out of town. She had a preliminary iridectomy. One particular

thing I remember about her case was that she had the highest degree of astigmatism following the operation of anyone I ever saw. She had some 6 D. of astigmatism, and with the correction she had 20/20 vision. She returned some few months later with considerably reduced vision in that eye and she had a tension of 50 mm. Hg. Schiötz. I did a corneo-scleral trephining below. The tension was reduced and, until she died three or four years later, she lost no vision.

Dr. L. M. Francis. One thing that occurs to me in this connection; Dr. Stieren has said nothing about the possibility of preexisting glaucoma or glaucoma tendencies in these eyes. Sometimes it is very difficult to make a diagnosis of chronic glaucoma. Is it possible that these operations were done upon eyes that would in the ordinary course of events have developed glaucoma anyway? I would like to know if the glaucoma was probably the result of the epithelial lining of the anterior chamber or was it due possibly to vitreous in the anterior chamber. The chairman of the meeting will probably have something to say concerning the change in the anterior chamber in relation to glaucoma which after all perhaps is the most interesting phase of this subject.

Dr. E. E. Blaauw. The subject is very intricate and very difficult. It occurs to me that we have to deal with two types of glaucoma, malignant and benign. The benign cases yield to miotics, the malignant do not. I think the malignant type is due to an ingrowth of epithelium filling up the anterior chamber, and with these you cannot do anything. The third case was a case of cyst of the anterior chamber. I would like to raise a question with Dr. Lewis. I think in connection with your study of the vitreous in different animals that what obtains in animals does not obtain in human beings. The human lens is only comparable with that of the ape. Prof. Stilling found the human vitreous a canal, which probably contained lymph, but limited by a membrane. He built on that a theory of accommodation. He thought the vitreous in the anterior part was contracted by the ciliary muscles and the fluid in the posterior part would be thrown back to the optic nerve. That has not been accepted. The thing is ten years old. I would like to ask Dr. Stieren if those cases which have been extracted without a conjunctival flap are not more liable to develop glaucoma, because the epithelium can more easily grow into the anterior chamber and form a cyst. I think he also mentioned that sometimes one of the two pillars of the iris getting into the wound produces glaucoma, and also the vitreous gets into wound and produces a chronic irritation. Is it possible to detect glaucoma? It can be seen with the corneal microscope and the Nernst lamp that there is a deposit of pigment, which adheres to Descemet's membrane, more than we expect to see, in old people and you see pigment deep into the crypts of the iris. Koeppe in Halle states that these conditions lead up to glaucoma. There they always examine the cornea and iris before beginning to dilate with atropin. We ought to study, of course, the angle of the anterior chamber, which is also possible with the Nernst lamp.

Dr. Stieren. As I expressed in the beginning of the talk these cases came at different periods of time, and I did not make any intensive study of them. Dr. Francis asked whether I looked at the anterior chamber with the corneal miscroscope, and whether I could recognize vitreous in the anterior chamber. It is not possible. Dr. Blaauw's question is answered in part as to the three different types of cases. The third case may have been an epithelial cyst in the anterior chamber. Literature records four or five cases in which the epithelium grows into the anterior chamber. The bullous keratitis I always thought to be due to an increase of tension. Risley's suggestion that mere paracentesis of the anterior chamber where the increase of tension may be due to the presence of vitreous in the anterior chamber is a good one. As to the exciting cause I do not think we know what the exciting cause is. I have seen glaucoma disappear after removal of a wisdom tooth, also fol-

lowing the removal of a tooth with an apical abscess. Lamb of Washington uses adrenalin and ductless glands. I do not think the loss of vitreous has anything to do with the formation of glaucoma. The vitreous chamber fills up, not with vitreous of course, but with a fluid.

Sclerosing Keratitis.

Dr. Albert C. Snell, Rochester, N. Y., presented Mrs. E. R., 68 years of age. Present trouble began in July 1920 during convalescence from an attack of erysipelas of the entire left side of face. When the swelling of the eyelids subsided, a dense white spot was noticed on the left eyeball.

August 6th, 1920 first ocular examination. A densely opaque oval sector was seen extending from the temporal limbus into the cornea ⅓ the corneal diameter. It involved the deep stroma, and in its center the dense opacity had a yellowish tint. The remaining cornea was very clear, and there was a very sharp demarcation between clear cornea and opaque. There was a slight elevation of tissue at temporal limbus surrounded by scleral and conjunctival inflammation. No ulceration. No staining with fluorescein. No vascularization of cornea. Slight iritis. Moderate pain. No temperature.

The opaque sector gradually extended into the cornea until two months later it involved ⅔ the corneal diameter, leaving a crescent shaped area of perfectly clear cornea. Four months after the onset, vascularization began at the temporal limbus, and now (seven months after onset), has reached the center of the opaque yellowish area, extending from above also. No pain for past two months. At no time was there any ulceration of the corneal tissue. Intraocular structures not involved.

Discussion. Dr. L. M. Francis. I have seen three cases that resemble this in part, but not to the same extent; they were not so large. The lesion began in the corneal stroma and at no time was it possible to elicit a stain from the epithelium.

One was in a case of a girl of twenty whose process went on. In that case I opened up and curetted the contents out. Another case which was very carefully studied, had a very bad alveolar process. The teeth had to be extracted following which this condition began to quiet. The third case, like the first, was in a healthy young person. That is, an infection occurred by the blood stream, picked up by the lymphatics, and the growth was excited in the deeper corneal layers. These cases all showed a slight anesthesia of the cornea over the area. There were no bacteriologic findings. In the one case I opened up no organisms were present in the growth.

Dr. Ed. Stieren. The only case I had to approach it was in a patient eight or nine years of age. You could press the contents from side to side. I made an incision at the limbus and it was a clear yellow fluid. No culture was taken. It was distinctly in the stroma of the cornea.

Dr. Price. I reported a similar case a few years ago, where the cornea became opaque and I brought this patient to Dr. Hubbell. Very shortly after that the patient developed tuberculosis and died. I always believed the trouble to be a tubercular infection.

CHICAGO OPHTHALMOLOGICAL SOCIETY

March 21, 1921.

Divergent Squint.

Dr. Thos. D. Allen (by invitation) presented the following case: This boy was brought in a little over a month ago with a divergence of the right eye, drooping of the right lid, nausea, vomiting, and headache. He was put into the hospital immediately for diagnosis. The diverging attacks began about three years ago and recurred every week to every month. The longest one preceding the present was the first and it lasted eight days, the succeeding ones lasting only about three or four days.

The nausea and vomiting associated with the headaches and divergent squint in the right eye have been rather aggravating. Upon covering one eye, they stopped immediately. Vision in the eye was very

poor. It was exceedingly difficult to have him do anything, such as chase balls across the room, because he would not cooperate well. Evidently there was vision in the right eye, the left eye being the fixing eye.

Examination revealed the spinal fluid absolutely normal; his blood was negative to the Wassermann test. He had, however, a leukocytosis of approximately 41,000, with 55 per cent lymphocytes. Subsequent counts during his stay in the hospital have gradually come down to normal, with the last reading 9,000, and the polymorphonuclear leukocytes over 50 per cent and lymphocytes 25 per cent. The ptosis has gradually diminished since he has been in the hospital until it is only slightly visible. The divergence has also gradually diminished, and the diplopia decreased, so that now there is none present at all. He can go around without any covering over his eye. There is some little asymmetry of the face. The right pupil has been dilated continuously, and it is impossible for him to move the eye more than a few degrees beyond the horizontal line.

He has been on Dr. Rothstein's neurologic service. A diagnosis of migrain has been made, but that is very questionable.

DISCUSSION

Dr. William H. Wilder said that these cases must be very uncommon. He thought he had seen but one before, and that seemed to be of the kind that was described by the neurologists as recurrent palsy occuring with migrain.

The Blind Spot.

Dr. Harry S. Gradle read a paper in which he gave a short review of the history of the discovery and investigations of the blind spot from the time of Mariotte to date. The various methods of study of the blind spot were then discussed, and particular emphasis was laid on the use of one or the other forms of tangent screens for the accurate delineation of the normal scotoma. Too short a distance between the screen and the patient was decried because minute variations led to a great error. Equally, too great a distance tends to emphasize the importance of the normal neutral zone surrounding the blind spot.

The findings regarding the blind spot in myopia, sympathetic ophthalmia, eclipse blinding, retrobulbar neuritis of accessory sinus origin, and medullated nerve fibers in the retina were then discussed in more or less detail. These were compared with the normal blind spot as measured with the author's magnet scotometer.

In conclusion it was urged that more attention be paid to the careful deliniation of the blind spot as many points of great clinical assistance can be deduced from such study.

Discussion. Dr. William H. Wilder stated that the question of arrangement of the fibers of the optic nerve as they emerged at the optic disc was an interesting one. The suggestion that was originally made, later confirmed by Fuchs, was that the peripheral fibers of the optic nerve were those that supplied the parts of the retina in proximity to the optic disc, while intermediate and peripheral zones of the retina were provided by fibers that were in the intermediate and central parts of the nerve. This seemed the most natural explanation but it was by no means proven, because there were other observers (Collins, Mayou and others) who held that just the reverse obtained; namely, that the peripheral portions of the retina were supplied by the peripheral fibers of the optic disc, and the intermediate and central areas by fibers more centrally placed in the nerve. The latter view did not seem so attractive because it would mean that the portions of the retina nearer the optic nerve would have to be provided by fibers that would come out from the nerve and then dip down thru the various layers of the retina to the percipient layer.

However, in practice he thought one might meet some cases which would seem to indicate that the latter view was just as tenable as the former. For instance, in cases of deep physiologic cupping of the optic disc on the temporal side of the nerve head, if hypertension of the eyeball occurred, the

vitreous could be readily forced into this cup and would exert pressure on the delicate nerve fibers of that side of the optic disc forcing them against the firm unyielding scleral ring. Such pressure would be likely to injure first those fibers lying next to the firm ring. It had been satisfactorily demonstrated that the macular and paramacular fibers occupied a space in the temporal quadrant of the optic disc, and pressure on these could produce the paracentral scotoma so frequently observed as an early sign of glaucoma. But above and below this segment of macular fibers, lay those destined for other parts of the retina and the well observed fact that contraction of the inferior or superior nasal field was also one of the early signs of glaucoma would seem to lend support to the idea that fibers going to parts of the retina concerned with the nasal fields must have been early subjected to severe pressure and the damage probably would be greater to those fibers lying next to the firm scleral ring.

Dr. Gradle has emphasized the importance of studying the blind spot in our clinical investigations. Probably this, like field taking was frequently neglected by the busy practitioner. Taking fields was very irksome and time consuming and hence might very easily be done carelessly and with inaccurate results. The utmost care was necessary on the part of the observer to see that the patient did not give the wrong information, and the observer must be on the alert at all stages of the examination. So there was a double source for subjective error. Speaking generally, he supposed field taking was about the most inaccurate examination that the average ophthalmologist did. If this was true of our perimetric measurements, it was probably equally true of our measurements of the blind spot, and in this one had been further hampered because until quite recently instruments for the purpose had been rather imperfect.

The introduction of the Bjerrum screen was a valuable improvement for it was impossible to outline the blind spot with any degree of accuracy with the ordinary perimeter. The campimeter of Peter was a valuable instrument and he had found it much more practical than the larger Bjerrum screen, although possibly not so accurate. He had recently been using with satisfaction the stereocampimeter of Lloyd, with which he thought he obtained even more accurate results, for the patient's attention could be more concentrated.

With exceptions, enlargement of the blind spot would seem to indicate pathologic conditions. It might occur from disease in adjacent cavities and spaces, the sinuses, and ethmoid cells, and this emphasized the importance of being able to measure this peculiar scotoma carefully and with all the accuracy possible, because it might be a deciding point in the whole case, and it might be, after carefully excluding all other causes for a suddenly developing blindness in one eye, that one had to rely on the measurements made of the normal blind spot as a guide or indication for operative procedure on the sinuses. In such cases it would seem that there was a reason for the theory that Fuchs advanced, that the peripheral fibers of the optic nerve head were those that supplied the contiguous area of the optic disc or nearby areas of the retina; and yet this was not absolutely proven by such an occurrence because it might be that in some of these cases the trouble in the optic nerve, particularly if it was in the canalicular portion, might result from edema in the central portion of the nerve from infection passing thru the small vessels that entered it.

As to enlargement of the blind spot, which appeared as an early sign of glaucoma, Bjerrum, and later his followers, Seidel, Rönne and others, pointed out that this was not so much an enlargement of the blind spot, as it was an area of blindness, beginning in some instances as a paracentral scotoma, that became linked up with the normal blind spot and it was that which Bjerrum laid particular emphasis upon. Seidel stated that there would be a sickle-shaped blind area upward and downward or both, that was connected with the normal blind spot.

These signs he had observed in the examination of early glaucoma and they emphasized the importance of a careful study and record of the condition of the blind spot in these conditions.

Dr. Gradle in closing the discussion said: The blind spot was not always oval, and not always round, particularly in the higher degrees of hypermetropia, where one found the blind spot more round than oval. The blind spot did not lie in the exact position depicted. It might have its greatest diameter above the horizontal median line or below as it was usually depicted. It might be comma-shaped or pear-shaped. It was usually jagged, due to projection of the larger vessels. On the average it would show a fairly oval blind area with the majority (approximately two-thirds) lying below the median line.

There were certain phases of examination which favored the Collins and Mayou idea of a central location of the peripapillary fibers from the retina, but such a location involved the idea of retinal decussation of fibers, which was something that had not been shown anatomically. It was difficult on that basis to explain many of the phenomena concerning enlargement of the blind spot that were found particularly in accessory sinus disease. He was inclined more to the probable, but not absolutely proven theory of Fuchs as to the peripheric location of these fibers in the intracanalicular portion of the optic nerve.

The most vulnerable portion of the nerve was the macular bundle and pressure would yield central scotoma far sooner than anything else. If the peripapillar fibers which dominated the outlines of the blind spot were located centrally, one would expect an enlargement of the blind spot with central scotoma in every case, but quite the reverse was true. Where there was central scotoma the blind spot enlargement was a secondary affair, if present at all. When there was enlargement of the blind spot as one of the early symptoms of retrobulbar neuritis, the central scotoma seldom, if ever, appeared. That would lean more toward the theory of the peripheral location of the fibers rather than central. Furthermore, the course of the retinal fibers showed no decussation of fibers, and the course of the retinal bundle could be studied carefully. If these fibers came from the center of the optic nerve or rose up to the center of the physiologic excavation, the fibers could be seen by the modern methods of ophthalmoscopy.

A Simplified Intranasal Operation For Obstruction of the Naso-Lacrimal Duct.

Dr. Robert H. Good described a simplified intranasal operation on the lacrimal sac and tube, which he said could be readily performed by rhinologists and ophthalmologists.

The nose is thoroly anesthetized with adrenalin and flakey cocain. The lower canaliculus is dilated, and with a syringe a few drops of a 10 per cent. solution of cocain in adrenalin are introduced into the sac. In nervous patients it is wise to inject the intra-orbital nerve with novocain and administer one-quarter grain of morphin hypodermically one-half hour before operation. He has occasionally injected novocain between the sac and the lacrimal bone as well as into the lacrimal groove.

The anterior end of the inferior turbinate is removed with bone forceps as close as possible to its attachment and just beyond the duct opening. A grooved lacrimal probe is now introduced thru the lower canaliculus and passed thru the naso-lacrimal duct into the inferior meatus of the nose. The probe should be as large as can be passed without force and without injury to any structures. An incision thru the mucous membrane is made from high up just in front of the middle turbinate down to the edge where the inferior turbinate has been removed, terminating just anterior to the probe. The membrane is elevated forward and backward, which makes two triangular flaps with the apices above. A special nasal chisel hollowed out with dull corners is placed at the anterior crista of the inferior turbinate. About one-quarter of the circumference of the bony wall is chis-

eled away. The anterior portion of the lacrimal bone, and the posterior portion of the frontal process of the superior maxillary bone have a depression on the orbital side in which lies the lacrimal sac, and the depression causes a bulging or convex elevation in the nose over the sac which makes it easier to chisel. This elevation of bone is chiseled off up to about the middle of the sac. A small crow beaked knife (curved bistoury) is now placed into the groove of the lacrimal probe, and the duct and half the sac incised. The flaps readily fall into place and the operation is completed. There is no aftertreatment required. By using a chisel, instead of bone forceps, we avoid injuring the membranous duct, and a larger section of the bony canal can be removed, and one can always have the lacrimal probe for a guide. By biting off the anterior end of the inferior turbinate one can do no harm to the duct. The flaps do not need to be sewed as they remain in place. A longitudinal incision thru the sac causes much less trauma than the removal of a section of the sac, and if the incision is long it drains better and there is no danger of cicatricial contraction of the sac.

It has been a common practice for years to slit the canaliculus in cases of dacryocystitis, but this practice is hitching the horse to the wrong end of the wagon. An eye with a slit canaliculus never looks normal nor drains the tears as readily as a normal canaliculus. This should never be done except in lesions in the canaliculi or upper portion of the sac.

Some operators describe the slitting of the inferior canaliculus as a part of their procedure in doing an intranasal operation on the sac. This destroys the capillary action of the canaliculus and makes the gravity of the tears practically nil, as the distance from the artificial opening in the sac to the common opening of the canaliculi is extremely short.

The essayist has not failed so far to restore the function in any case that he has operated, and he has not carried out any after treatment whatever except the use of a few drops of adrenalin 1/20,000 in the eye morning and night, and occasionally injecting a little argyrol into the canaliculus with a syringe to demonstrate to himself and to the patient that the argyrol comes out thru the nose.

The author then detailed five cases in which he had performed this operation with gratifying results.

Discussion. Dr. William H. Wilder asked Dr. Good to explain what he did in cases in which there was a dense stricture that was absolutely impermeable. Did he use force in passing the probe thru the bony duct? Did he expect the duct, in which there was an impermeable stricture, ever to function again? Would it remain open after such an operation? Would there not be a continual contraction of the stricture as before, when the slit in the side of it closed?

Dr. Sidney Walker, Jr., asked Dr. Good in regard to the bacteriology of the conjunctival sac following these operations in cases of chronic dacryocystitis, where a cure was to be performed, and further as to what methods were employed for irrigation of the sac, and whether it was necessary.

Dr. Good spoke of putting a few drops of argyrol into the sac itself. He had caused an argyrosis in that way, and he should rather think argyrol would be contraindicated in such cases.

Dr. Harry S. Gradle said that it stood to reason that Dr. Good's procedure was not indicated in such a tear sac where there was stenosis or stricture in the upper portion of the sac or the lacrimal canal superior to the sac. It was of value only where the stenosis was below the median half of the sac or nasal duct.

The anterior ethmoidal cells were in intimate relationship with the upper portion of the lacrimal apparatus, and was it not extremely probable that a large percentage of cases of socalled dacryocystitis were purely secondary to ethmoidal disease, and that some of the cures that were affected by various types of operation were due to removal of the primary source of infection by the spontaneous cure of the ethmoiditis?

According to the figures from some of the foreign clinics, about 80 per cent of extirpations of the sac were failures, in that they failed to restore the function of the normal tear passage, so that the tears did not have free access to the nose, and 40 per cent of the Toti operations failed to show free passage of the tears in connection with the use of argyrol.

There was one other procedure that should be mentioned, the method of von Szily of taking roentgenoscopic pictures of the tear passages. He injected a small amount of barium or thorium sulphat, with a fine syringe into the tear passage, and then he took a roentgenogram of the passage. This gave an exact outline of the tear passage as far down as the fluid could be syringed, and the location of the stricture could be determined and the type of operation to be employed was more readily available.

Personally, he did not believe anything like the last word in regard to tear sac operation, had been said, and would not be until some operation which would restore the function of the lacrimal passage to its natural state had been devised.

Dr. George F. Fiske said that the operation described by Dr. Good was extremely useful and could be employed in many cases. After all, cases in which there was stenosis of the lacrimal duct were not common. This operation was adapted to those cases where the trouble was at the lower end.

Dr. Good, in answer to Dr. Wilder's first question about stricture, said that he proceeded without the probe. He chiseled away the inferior turbinate which formed the inner wall of the bony duct, then the probe went down into the nose and he proceeded.

He had had two cases of double fracture of the superior maxilla in which he did this operation.

In answer to the other question, if there was destruction of the mucous membrane in the sac, or if one had cicatricial tissue obliterating the sac, this operation did no good. In a case like that, perhaps the old method of extirpating the sac might be the best, but very few sacs needed to be extirpated nowadays.

ROBERT VON DER HEYDT,
Corresponding Secretary.

SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

DECEMBER 16, 1920

DR. G. ORAM RING, CHAIRMAN.

Extensive Choroiditis.

DR. KRAUSS presented a man, aged twenty-one years, suffering from plastic choroiditis of sudden onset in the left eye. He had clouding of the vitreous, with a large mass of exudate in the choroid, in the upper part of the field. As the exudate absorbed, choroidal changes remained. The cause of this exudative choroiditis was obscure. The Wassermann was found negative, but the von Pirquet reaction was positive and the family history was negative. The patient is a large, robust adult, apparently in the very best of health. Much improvement, followed the use of iodid of potassium.

Traumatic Dislocation of Lens.

DR. KRAUSS presented a man, aged fifty-six years, who was struck by a brickbat on the right malar bone. He developed immediately an intense chemosis of the lids with great proptosis of the eyeball. There was a small laceration of the lower lid near the outer canthus, and large irregular, slightly elevated triangular opacity of the cornea with little inflammatory change. No hemorrhage was apparent in the deep anterior chamber, nor reflection of blood from the deeper chamber, tho the vitreous excluded all light. The eye was blind except to the strongest light stimulus.

The X-ray showed no fracture of the orbit nor of the surrounding bones.

At present the cornea shows peculiar gray-white punctate opacities, covering the area occupied by the corneal lesion. The pupil is widely dilated, showing a very narrow rim of the iris.

The anterior chamber is very deep with a black pupil.

Ophthalmoscopically.—There are a few fine vitreous opacities. When the

patient looks down, in the extreme lower part of the fundus, the edge of the lens can be seen apparently attached to the zonula. When the eye is moved up and down, the lens swings toward the center of the vitreous as tho attached to a hinge. The eyeground is well seen. The nerve is gray-white, the arteries extremely contracted, the veins comparatively full. Scattered thru the ground, especially in the macular region, the choroidal pigment is heaped irregularly, but there is no evidence of rupture. He can count fingers at one foot and has an apparently good light field.

These conditions have suggested a diagnosis of rupture of the ciliary body, complete dislocation of the apparently clear lens, with partial optic atrophy and choroidal changes.

The intensity of the blow was apparently carried into the soft structures of the orbit, without fracture of the bones. An intense orbital hemorrhage and chemosis of the orbital tissues resulted in proptosis. The peculiar opacities in the cornea and the lack of reaction, which the presence of a foreign body in the cornea would bring about, indicated a trophic change. The almost complete blocking of the retinal artery may be secondary to the nerve and retinal changes, rather than any direct effect of the blow. A rupture of the optic nerve would probably have resulted in a greater loss of visual field, and more pronounced atrophy.

Tay-Sachs Disease.

Dr. Leighton F. Appleman reported a case of amaurotic family idiocy in a patient aged fifteen months, the first-born of Hebrew parentage, who appeared to be normal up to six months of age.

After this time the parents noticed that it became dull, apparently losing its sight, muscularly very weak and flabby, and at the present time unable to hold its head up nor to sit up or walk. It cannot move its arms—in fact, it is perfectly relaxed, altho apparently well nourished.

Ophthalmoscopic examination reveals both optic discs oval, clearly outlined, but atrophic. Each macular region shows the typical picture of this disease—a white area about twice the diameter of the disc, with a cherry red spot in the center. The vessels and peripheral portions of the eyegrounds appear normal.

No history of consanguinity of the parents was elicited. Both parents were healthy—no history of lues and no abnormality of the eyes were found in either.

Attention was called to the pathologic findings in these cases previously reported and to the etiologic factors which have been thought to cause the condition. Treatment is unavailing.

Resection of Sclera for Detached Retina.

Dr. Charles R. Heed exhibited a patient showing the result of a modified Müller operation. The patient had a broad detachment, practically the entire temporal retina, for one month previous to the operation. There was complete absence of the nasal field (hemianopsia), with eccentric vision of 6/LX. Five weeks following the operation, fields for 10 mm., white and red were normal and central vision equalled 6/XXI partly. The ophthalmoscopic picture of the retina disclosed little or no displacement, except at the site of scleral section, where a moderate elevation of the retina was noted.

Dr. Hansell said that any treatment, medicinal or operative, that can effect cure in retinal detachment is worthy of consideration and trial. Dr. Vail, in the *November Archives of Ophthalmology*, contributes a thoughtful article concerning the etiology. He suggests that in most cases, if not in all, of idiopathic detachment the secretory glands of the ciliary body have ceased to functionate. Hence the aqueous humor becomes more and more reduced in quantity and the relation between the pressure in the posterior part of the globe and the anterior becomes changed. The withdrawal of normal tension causes passive hyperemia of the tunica vasculosa. This allows diapedesis and transudation. He says that the usual operative measures

do not cure more than one out of 1,000 cases. The next article, by Edgar S. Thomson, tells of seven cases out of 75 cured by trephining the sclera and immediate aspiration. Müller's operation is designed particularly for detachment in high myopia. Dr. Heed is to be congratulated on his skill and attention to minute details in the performance of the operation on his patient and in the satisfactory result. The procedure must appeal to us as worthy of trial in all cases in which the sclera is too large for the ocular contents.

Case of Coralliform Cataract.

Dr. William Zentmayer exhibited a patient who was brought because her vision was too poor for her to continue her studies. She was an Italian child, aged seven years, who had in each lens a typical coralliform opacity. By oblique illumination parts of this opacity were seen to be distinctly crystalline. Vision: right eye = 5/60; left eye = 5/20. Corrected vision: right eye, 5/20; left eye, 5/15. This hereditary type of cataract was until recently supposed to be due to a fault in the development of the lens, but recently Verhoeff has had the opportunity of examining a lens presenting this type and found the opacity to be made up of crystals. Thoro chemical and microscopic examination failed to determine their nature. Verhoeff assumed them to be protein, being probably derived from myelin, which he found to be normally present in an infantile lens examined by him. He supposed the crystals to result from this substance thru deficient calcium metabolism. Some question had arisen as to whether the case presented should be operated on at the present time. From the vision, as determined scientifically, operation may seem uncalled for, but since the child cannot continue with its studies, operation would seem defensible.

Discussion. Dr. Posey advised needling the eye with poorest vision, without making any effort to recover the crystals. After the successful completion of that operation and the assurance of good vision in one eye, he thought Dr. Zentmayer might risk the removal of the remaining lens *in toto* for the purpose of obtaining the crystals for analysis.

Dr. McCluney Radcliffe advocated the more radical operation of removal of the lens in its capsule, in order to prevent the danger of some of the crystals dropping into the anterior chamber and setting up a persistent irritation. He stated that the operation should be done under complete general anesthesia, using either the Noyes or the Ziegler loop to remove the lens. When done in that way, he considered it a perfectly safe operation, as he had frequently employed it without the slightest loss of vitreous.

Case of Locomotion Pulse.

Dr. Zentmayer showed a man, aged twenty-four years, suffering from aortic regurgitation. He came to Wills Eye Hospital because of the developing of proptosis of the right eye. Locomotion pulse involving the entire arterial retinal tree was present in the right eye.

Pernicious Anemia.

Dr. Zentmayer presented a man, aged thirty-one years, in whom a diagnosis of pernicious anemia had previously been made and was confirmed by Dr. Musser. The changes in the eyes were not typical. Both fundi were rather pale and there was a low-grade neuroretinitis in the left eye and a marked pallor of the optic nerve head in the right eye. The contrast between the artery and the vein was not as pronounced as in normal eyes. In the extreme periphery of the right eye there was the remnant of a small hemorrhage apparently from thrombosis of a venule.

Diabetic Retinitis.

Dr. Zentmayer showed a man, aged fifty years, who came because of smoky vision, which had begun three months ago. He considered himself in perfect health. In both eyes the retinal exudation was of the massive type. In the left eye the saccular exudation was surrounded by a zone of hemorrhages and on either side of almost all arteries there was a broad white strip about one-half disc diameter in width. In the right eye the changes were similar, but not so pronounced. The right temporal vein was thrombosed. The

urine contained a high percentage of sugar.

Gunshot Wound of the Orbit.

Dr. Wm. Campbell Posey exhibited a case of gunshot wound of the head involving the orbit. The bullet of a 38-caliber revolver fired at very close range struck the subject, a young colored woman, midway between the eyes, and entering the head thru the nasal bone was split into two large fragments and a number of smaller ones either by the bone or by the quite heavy goldfilled bridge of a pair of spectacles, which fortunately were worn at the time of the accident. Scarcely stunned by the shot the patient walked several squares to the Howard Hospital, where the left eye was found to be somewhat proptosed and diverged and almost blind. The right eye was unaffected. The fragments of shot revealed by the x-ray were all in close association with the sphenoid bone. The large fragment on the right side fortunately stopped just short of this cavity and was lodged in the posterior ethmoidal cells; the fragment upon the left side had apparently fractured the inner wall of the orbit and injured the optic nerve in the foramen, the nerve showing later the characteristic signs ophthalmoscopically of optic atrophy and vision being reduced to hand movements. Several of the smaller fragments had been removed by the rhinologist to the hospital, but the two large fragments just referred to were permitted to remain *in situ*. The external wound healed rapidly and at no time was there constitutional or local symptoms with the exception of those referred to.

Eye Symptoms in Obscure Brain Disease.

Dr. Howard F. Hansell reported the case of a boy of nine years suffering from attacks of intense headache, projectile vomiting and delirium lasting several hours.

The ocular symptoms on admission consisted of unequal pupils only slightly contracting to light; double choked disc; star-shaped, bright, glistening figures in foveal regions three or four times the size of the disc; retinal hemorrhages; complete left hemianopsia; nystagmus on forced rotation. V = R. 6/60. L., hand movements.

The symptoms of disease of the cerebrospinal nervous system on admission were slight weakness of the left arm and leg; no inequality of the face; slight incoordination of the left arm with adiadochokinesis; distinct asynergia of the left leg; the reflexes were normal and there was no loss of sensibility. The neurologist detected hemianopic pupillary reaction. X-ray, urinalysis, blood, nose and accessory sinuses negative.

The conclusion drawn from the complete Bárány test was that "the lesion appears to be in the upper half of the pons on the right side, not involving the posterior longitudinal bundle, and below the floor of the fourth ventricle.

The boy's faculties have deteriorated during the several months of observation. He has lost weight, mentality, equilibrium and muscular power.

The ocular complications comprise all of those commonly associated with brain tumor and by their very variety and number excludes the possibility of localizing value. They point to a gross lesion involving the pons, the cerebellum, the optic tracts and the primary optic centers. It is only by assuming that the lesion is extensive, that there has been an increase of intracranial fluid which would naturally be associated with it that the symptom may be explained. Dr. Dercum believes that the neoplasm developed first in the cerebellum, especially in the right side and extended forward to involve the corpora quadrigemina. Death ensued October, 1920, eleven months after the first symptoms appeared.

J. Milton Griscom, M. D.,
Clerk.

OMAHA AND COUNCIL BLUFFS OPHTHALMOLOGICAL AND OTO-LARYNGOLOGICAL SOCIETY.

February 16, 1921

Dr. H. B. Lemere, Chairman.

"Prisms, Bases In." This paper was read by Dr. F. W. Dean.

Discussion. Dr. J. M. Banister, Omaha, uses prisms bases up and

down and bases out to correct corresponding defects. It is different, however, with these cases of convergence insufficiency where it is the innervation to the muscles that is at fault. It is not the excessive action of the external rectus that produces the defect. Therefore he does not believe in simply giving the defective muscles a crutch to lean on but in working on the positive side. This he does by exercising the internal recti according to Gould's method with prisms base out, starting with the object close to the patient, moving gradually away as long as he can see it single. He quotes the case of a man who at first could overcome only a 2 diopter prism, who later became able to overcome a 25-30 diopter of prism with entire relief of his symptoms of asthenopia. In testing the muscles, he emphasizes the value of testing the near point for convergence. This should be not less than three inches, no matter what a patient's phoria for distance. A patient who has convergence insufficiency for close work, may, in an effort to overcome it, develop a spasm of convergence for instance so that the convergence insufficiency would not be detected by the ordinary Maddox rod test. When the degree of insufficiency is too marked, however, exercises will not overcome it and he operates by a tuck. He congratulated Dr. Dean on the report of his work and thinks he has proved that prisms bases in do not increase the exophoria at first present.

Dr. L. C. Bleick depends more on exercises than on prisms. In the few cases where he used prisms base in he has had to increase their strength.

Dr. Sanford R. Gifford believes in using exercises by Gould's method, as described by Dr. Banister, in cases where the convergence insufficiency is of a slight degree. In greater degrees, however, where actual double vision is present, it is often impossible to overcome any prism. Hence prism exercises are impossible, and in these cases if an operation is for any reason, not done, the only thing left is to give the defective muscles support in the shape of prisms, base in.

Dr. Geo. B. Potter thinks in considering convergence insufficiency all influences should be taken in account, constitutional weakness and any conditions impairing muscle action, anomalies of the orbit, etc., making it necessary to study each case individually. He believes, however, that persistent exercise will help a good many cases.

Dr. Lemere thinks that Dr. Dean has undoubtedly proved that the use of prisms has not increased the exophoria originally present. He believes, however, that correcting small degrees of exophoria is usually unnecessary. He describes his own case as an instance. He originally had 8 degrees of exophoria and 3½ of right hyperphoria along with considerable astigmatism. Correcting the astigmatism alone made him uncomfortable for about ten years. Then asthenopic symptoms caused him to correct his hyperphoria by prisms and since then he has been perfectly comfortable. His exophoria has actually decreased to 5 degrees. He believes that exercises will correct even higher degrees than his. The simple pencil exercise may help some cases.

Dr. Dean does not prescribe prisms, base in, in all cases of insufficiency. In some cases of the higher degree included in his series, an operation had been refused. He finds exercises to be of some value but seldom permanent. He believes that the constancy of the strength of prisms taken in his patients after years proves that the defect is not one of innervation which would undergo more or less change but is an anatomic defect. He even corrects exophoria of ½ degree and often gives a patient comfort in this way when correction of the refractive error alone has proved unsatisfactory. He believes cases which appear to increase the strength of their prism are those in which full correction was not given at the first test, due to muscular spasm which was not fully relaxed. He showed a table of similar data compiled from his cases of hyperphoria. He said that the method, tho not scientific, has given

patients comfort after other methods in the hands of good men have failed.

S. R. GIFFORD,
Cor. Sec'y.

COLORADO OPHTHALMOLOGICAL SOCIETY.

March 19, 1921.

W. C. FINNOFF, presiding.

Syphilitic Disease of Retinal Vessels.

J. A. MCCAW, Denver, presented a negress aged 38 years who had come complaining of somewhat indefinite disturbances of the left eye dating back about five years. She could not use her eye at night and light hurt it. Ophthalmoscopic examination showed that almost the nasal half of the disc was covered with a dull grayish membrane, which also extended on to the retina for a half disc diameter. This membrane protruded 4. or 5. D. into the vitreous, and had the general appearance of a retinitis proliferans. Extending from the disc downward and toward the nasal side as far as could be seen was a dull grayish band about the width of one of the larger blood-vessels, and which apparently consisted either of old exudate or of scar tissue completely covering a branch of the central artery or of the obliterated artery itself; the condition being that known as endarteritis obliterans. In close proximity to the vessels were numerous patches of gray exudate deeply pigmented with retinal treatment. The case was regarded as of syphilitic origin.

Anterior Staphyloma.

E. E. MCKEOWN, Denver, presented a woman aged 23 years whose cornea was highly staphylomatous, there being nearly five mm. of protrusion. The eye had suffered a lacerating injury at sixteen years of age, the iris prolapsing. Four years after the injury an operation was performed, the nature of which was uncertain, but which was said to have been done to keep the eye from protruding further. The patient was now beginning to have some pain. The vision was reduced to light perception, and the surface of the cornea was generally hazy. The posterior segment of the eyeball seemed to be normal.

DISCUSSION.—J. M. Shields, Denver, thought that the eye would very likely have to be enucleated.

F. R. Spencer, Boulder. Cauterization of the cornea might help, preferably in an area away from the region of the traumatic iridectomy. An operation might be tried for lowering the ocular tension, which even if it is normal is relatively too high for the resistance of the cornea. Verhoeff of Boston uses a flat cautery, and deals with about a fourth of the corneal surface at each cauterization.

C. A. Ringle, Greeley, thought that any operation on this eye or even leaving it as it was would risk its becoming dangerous to the other eye. Enucleation would be preferable.

C. E. Walker, Denver. The objection to removing an eye that has some sight and is not likely to produce sympathetic trouble is that if anything happened to the second eye the sight of the first eye might be greatly valued.

Right Optic Atrophy, Left Dislocated Lens.

E. E. MCKEOWN, Denver presented a woman aged 44 years who had come to find out whether a left cataractous dislocated lens could be removed. There had apparently been a similar condition in the right eye, which had been operated on some years previously. The operation had apparently been well performed, but the patient was under the impression that immediately after the operation for the removal of the cataract the vision of the right eye had disappeared, and there had been no subsequent recovery. The right optic nerve was atrophic. The cataract in the left eye had fallen back into the vitreous, but altho the upper part of the fundus of this eye was clearly visible and apparently normal, the optic nerve could not be seen. The patient believed that the formation of cataract in both eyes had resulted from a nervous shock due to lightning striking near her.

DISCUSSION.—C. E. Walker, Denver. It would be advisable to make an in-

cision above, leaving a bridge of cornea, and then withdraw the knife and remove the speculum. The incision should then be completed with scissors, and the lens extracted by passing a vectis behind it and making counterpressure as the lens was brought forward. The blindness of the other eye complicates the question as to the advisability of operating on the left eye.

Edward Jackson, Denver. The patient apparently gives a history only of mental shock due to the lightning, but the history of gradual loss of sight in the course of a year or so is such as might be obtained after the direct action of lightning upon the eye. In a personal case blindness from cataract formation had come on very gradually after a lightning stroke in the mountains, and cataract operation was successfully performed twenty-seven years after the injury. In Dr. McKeown's case the question of taking a certain amount of chance as to the outcome of the operation should be squarely put up to the patient.

Interstitial Keratitis.

J. M. SHIELDS, Denver, presented a youth aged 18 years who for the past eight years had had interstitial keratitis of one or both eyes with later resulting disturbances. At the present time both corneas showed triangular areas of opacity, with the bases downward and the apices extending to the center of the cornea. In each eye there was marked posterior synechia, but in the right eye this had given way to a considerable degree under atropin and dionin. At the age of ten years the patient had had an attack of so-called inflammatory rheumatism with effusion into both knee joints. At the age of eleven years both eyes became inflamed at short intervals and the case was diagnosed as one of interstitial keratitis. The patient had been under treatment of various kinds until about a year before the date of report. A negative Wassermann test had been obtained. but in addition to the effusion into the knee joints and the interstitial keratitis, the presence of inherited syphilis was supported by Hutchinson teeth and by a deafness which was not explained by any evidence of previous inflammation. It was therefore proposed to initiate antisyphilitic treatment.

DISCUSSION.—G. F. Libby, Denver, commended the treatment of the case as a syphilitic in spite of the negative Wassermann. Two months previously he had examined a typical case of binocular interstitial keratitis in a girl of nine years, whose former ophthalmologist had refrained from giving mercury because the Wassermann was negative. Two further Wassermann tests proved positive (plus two), and the case progressed favorably under the addition of mercury to the treatment. Another case, that of a girl of fourteen years, was referred because the family physician was not satisfied with a previous diagnosis of tuberculous keratitis. In the left cornea of this patient there were the typical appearances of interstitial keratitis, and there were also characteristic Hutchinson teeth. Specified treatment was instituted and recovery was complete in three months, only a faint nebula remaining and vision reaching 5/12. In this case a Wassermann test was not obtained, but the evidence pointed to inherited syphilis.

Perforating Injury.

J. M. SHIELDS, Denver, presented a man aged 40 years who on February 11, 1921, had been injured by a spike which flew up and struck the right eye. The perforating wound extended from the lower central part of the cornea downward and inward well into the sclera, and the iris presented in the wound. A good deal of vitreous was lost during removal of the protruding iris, so that no further interference was attempted but the eye was closed under a pressure bandage. X-ray examination showed no intraocular metallic foreign body. The eye was now quite quiet, vision had recently been recorded as 20/200, and it was proposed to attempt to save the eye.

Optical Iridectomy.

J. M. SHIELDS, Denver, presented a man aged 39 years whose left eye had received a lacerating injury from a peace of coal eighteen months previously. The eye was not painful but there was very little vision. There was

a vertical scar in the left cornea in line with about the temporal boundary of the normal pupil. The iris was caught in the wound and the nasal half of the iris was pulled completely across the normal pupillary area. Light projection was very uncertain. Was an optical iridectomy advisable?

DISCUSSION.—E. M. Marbourg, Colorado Springs, suggested that the operation called for was an iridotomy, which could be repeated if necessary, an iridectomy being impracticable because the iris was bound down in all directions.

C. E. Walker, Denver. In a case similar to this in which the lens was not present, I tried to make an iridectomy, but there was a sort of membrane behind the iris, and altho the two pieces of iris are out of the way the membrane, probably exudative, still remains. I am therefore rather doubtful as to the advantage of going into this kind of eye.

E. R. Neeper, Colorado Springs. If the lens is cataractous in this case I do not see how we can do the operation suggested by Dr. Marbourg. My idea would be to make a buttonhole in the iris, going in with the De Wecker scissors. After such an operation one might be able to decide the condition of the lens and what further to do.

Wharton-Jones Operation for Ectropion.

W. C. BANE, Denver, presented a man aged 40 years whose face had been burned by a gasoline explosion in 1905. Scar formation had resulted in ectropion of both lower eyelids and of the inner end of the left upper eyelid. The right lower eyelid had been operated upon by the Wharton-Jones method, that is making a V-shaped incision which after dissecting the scar from the deeper tissue was sutured in the form of a Y. The result was apparently quite successful. The same operation would be done later on both left eyelids.

Sclerosing Keratitis.

G. L. STRADER, Cheyenne, Wyoming, presented a woman aged 28 years whose right eye had been inflamed at intervals for the past five years, usually during hot weather, and who had come in August, 1920, complaining of inflammation in this eye of two or three weeks standing. In the first attack five years ago both eyes had been red but the right was worse. In August, 1920, there was scleral and episcleral inflammation downward and outward from the right cornea. There was some marginal involvement of the cornea, and a hair like opacity extending toward the pupil. This opacity did not stain. There was very little pain or photophobia. The fundus and media were clear, and the vision of this eye was 20/30+. The left eye was apparently normal, and had vision of 20/40+. The teeth, nose, and general health were normal. After improving for a few weeks, the patient was not seen again until February, 1921. The inflammation had subsided, but in January she had noticed a corneal opacity and poor vision. The vision of each eye with correction, however, was 20/20. The right eye was not red, but there was a dense interstitial opacity of the lower outer quadrant of the cornea, triangular in shape and extending to the corneal margin. The opacity thinned out toward the pupil. There was one rather large bloodvessel deep in the corneal substance. In the upper outer quadrant of the left cornea was a small triangular opacity two by three mm. which had been observed in August, 1920. The family history was negative, and two children born since the trouble first appeared were perfectly normal. A Wassermann test had not been made. The condition seemed to agree with Fuchs' description of sclerosing keratitis.

D. H. Coover, Denver, said that he had seen some cases of this character clear up under Griffith's mixture, which contained iron and aloes.

W. H. Crisp, Denver, referred to a case having a certain amount of resemblance to that presented by Dr. Strader, in which the condition had rapidly improved under the use of tuberculin.

Dr. Strader (closing) said that the patient gave a history of some miscarriages a few years ago, and this might lend color to the supposition that the cause was syphilis.

Plastic Improvement of Cicatricial Eye Socket.

W. C. FINNOFF, Denver, presented a young man who in June, 1920, had been struck by the blade of a revolving automobile fan, which had cut completely thru the lower vertical third of the left upper eyelid at the junction of the outer with the middle third of the lid, had cut thru and destroyed the eyeball, necessitating enucleation, and had completely divided the entire thickness of the lower lid at the junction of its inner with its middle third. The case was operated upon by a general surgeon.

When the patient was first seen by Dr. Finnoff on February 2, 1921, the lower lid was greatly retracted by the scar, which left an unsightly V-shaped deformity. The upper lid was drawn into the orbit by a well marked band of scar tissue. This band was divided on February 25, and a cast made of dental modelling compound was placed in the orbit to prevent union of the cut surfaces. Six days after this operation a small artificial eye was retained in the socket. On March 16 the deformity was entirely corrected by a plastic operation on both lids. This operation was analogous to the operation usually done for the correction of harelip, the deformity being overcorrected so as to allow of the development of a normally shaped lid margin by subsequent cicatricial contraction. One third of the stitches were removed twenty-four hours after the operation, a second third on the following day, and the remaining third at the beginning of the fourth day.

Epithelioma of Eyelid.

W. C. FINNOFF, Denver, presented a man aged 47 years who four or five years previously had first noticed a small tumor on the right lower lid. The tumor was excised at that time. Recurrence was noticed four or five months previous to the date of presentation and progressed rapidly. When the patient was first seen by Dr. Finnoff there was an ulcer eight mm. in diameter extending from the lid margin down into the cul-de-sac. The ulcer had an angry appearance and had completely perforated the tarsus. Another roughened area, about the size of a split pea, was noticed on the margin of the lower lid at the inner canthus. Five weeks and four weeks ago respectively two exposures had been made to the lower lid with twenty-five mg. of radium. At the time of presentation all signs of activity had disappeared, and the site of the epithelioma was replaced by fibrous tissue.

Injury to Eye from Steel.

Dr. Finnoff also presented a man aged 44 years, whose right lower lid had been burned in 1916 with a piece of hot steel. At the end of a year the wound was still not entirely healed, and the ulcerated surface was curetted and otherwise treated by a dermatologist. The surface healed and remained in this condition for six months, at the end of which time it again broke down, and the ulceration later extended to the ala of the nose. When the patient was first seen in December, 1920, there was a large ulcerated area involving the cheek and the right side of the nose. The lower eyelid had been entirely destroyed, and the ulceration extended back under the globe and into the maxillary sinus. The patient refused to permit enucleation and evisceration of the orbit, with removal of epitheliomatous tissue from the nasal sinuses. On December 31, 1920, twenty-five mg. of radium was applied to the epithelioma for a period of four hours over each area until all accessible parts of the growth had been treated. In two weeks a marked improvement was noted, and the ulcerated areas were filled in with epithelium and scar tissue, but recurrence in the orbit and nose was expected unless the patient consented to surgical intervention followed by radium application.

DISCUSSION.—F. R. Spencer, Boulder, referred to a series of cases reported upon a year or so ago by a writer whose name he did not remember, but who advocated leaving the antrum permanently open in such cases, so that it could be watched for recurrence. In every case complete surgical removal was desirable and radium was used.

WM. H. CRISP, Secretary.

SPECIAL REPORT, LT.-COL. HENRY SMITH IN PHILADELPHIA.

L. Webster Fox, M. D.,

PHILADELPHIA, PA.

These are observations on a Clinic held at the Medico-Chirurgical Hospital Graduate School of Medicine, University of Pennsylvania, May 19th, 1921, at which intracapsular extraction of cataract and other important ophthalmic operations were demonstrated by Lt.-Col. Henry Smith, formerly of Amritsar, Punjab, India.

It seldom happens to the average surgeon to witness the work of a genius, in such profusion away from his natural habitat, as has occurred within the past few days in this city, and it seems fitting that the observations of this work should become a matter of record. Such comments or criticism as we may have of his operation are best reserved for such time when the end results are at hand to justify the criticisms. Some of the points of his technic are a trifle startling to say the least, but, on the whole, he has acquitted himself as a surgeon of no mean ability, and as one who was thoroly at home with his chosen field of work.

The program of this particular clinic covered cataract extractions, iridectomies for postoperative occlusion of the pupil and iridectomies for glaucoma, with a practical demonstration of the intracapsular operation upon pigs' eyes.

Colonel Smith's armamentarium consists of an irrigator, good illumination, eye speculum, Graefe knife, fixation forceps, scissors such as we use in muscle operations (not conventional iris scissors), an especially devised lid elevator, blunt hook of the size used in muscle operations but more heavily mounted, a heavily mounted broad flat director curved on the flat, and box of cigars concealed about various parts of his person. The last seems to be as essential as the first, and it is no libel to state that the operator smokes during the clinic between operations and frequently maintains the cigar in his mouth during the operation, but with the characteristic dexterity does not allow the ashes to drop within the field of operation. The assistants and onlookers are not permitted the same privilege, however, and this slight may be responsible for some animus in the noting of the more important work. This feature of the operator's work has been outstanding in all of his American clinics and has served to create such a startling impression that due justice may not have been given to the operation itself.

The preparation of the patient seems to have mattered little to the surgeon just so long as he (the patient) had the condition for which an operation was indicated. This after all should be the real preparation. It is to be regretted very often that it is not so considered. However, in all these cases my preparation had been followed to the letter until the patient was brought into the presence of Colonel Smith.

He noted that in all the cases, the cocain anesthesia was attended by mydriasis, and inquired whether atropin had not been used, and further remarked that the cocain must be unusually good over here; from which we must infer that he must use in his work either less than four per cent solution, or a grade of the alkaloid inferior to ours, or else he begins operation in his own hospital before anesthesia is complete. There were no signs that the cocain had been used too profusely in these cases, the cornea showed no desquamation or wrinkling. Colonel Smith allows six minutes for anesthesia. Nearly all the patients had the eyebrow on the affected side shaved, but in one or two a shift was made to an eye not so prepared, but it was of no consequence to the operator.

In passing it may be noted that one washing of the hands seemed to have sufficed for several operations. The speculum having been introduced, the eye and conjunctival cul-de-sac were thoroly flushed with 1 to 4,000 bichlorid solution. He is keen for free flushing. The speculum he prefers is

is the Smith speculum, not one of the fixed stop variety. Having freely flushed the eye, he gently expresses the excess of fluid out of the cul-de-sac by running his thumb over the closed lids. One would think he were pressing heavily upon the lids, but a repetition of this movement convinces one he is doing something very clever.

Being right handed he stands behind the patient, except when operating on the left eye, in which case he stands to the right for the incision only. The assistant stands to the left. The incision is made with a Graefe knife or modification. The point of entrance of the knife is at the sclero-corneal margin and corresponds to the horizontal meridian, or 180 degrees, and after traversing the anterior chamber emerges at a similar point in the sclero-corneal margin on the other side. Colonel Smith lays great stress upon the necessity of adhering to these directions, and emphasizes above all things the necessity of a broad incision. There is nothing hesitating in the way he makes this incision, using only a forward movement before he brings it to a conclusion in the conjunctiva above. This is accomplished largely by making the heel of the knife describe a portion of an arc. In this series nearly all had conjunctival flaps, whether by accident or design is left to conjecture, as the Colonel is a worker not a talker.

Fixation forceps are then given to an assistant, who grasps the conjunctiva and subconjunctival tissue near the lower margin of the cornea, holding these structures out firmly. The operator then grasps the iris in a manner all his own,—the idea being to hold one of the blades of the iris forceps stationary while the other one moves. Try it. This is done by grasping the forceps with the thumb and first finger, then the second finger is used to impart motion to the adjacent blade. The fixed arm or blade is inserted in the wound just inside the superior corneal margin—the moving blade strokes (or scrapes) the cornea gently, expressing ing the iris into the grasp of the two blades as the margin of the incised cornea is reached. It is then pulled out gently and snipped off with the unusually heavy scissors previously referred to. The operator stopped to demonstrate the proper way to hold scissors, using the thumb and third finger—this way they could be made to cut. Incidentally he supported the heel of the scissors on the base of the patient's nose while the unoccupied fingers of the hand holding the forceps retracted the brow and steadied the hand on the patient's forehead. This entire procedure obviously does not make for a very large iridectomy. One operation without any iridectomy demonstrated that it was not absolutely necessary.

The speculum is then removed (not over gently it would appear). The motion being outward, its removal seems to occasion no distress. An assistant then holds down the lower lid and fixes the head at the same time in a very definite manner. The hand, for the most part, embraces the lower jaw while the thumb is extended and holds down the lower lid by pressure of the ball of the thumb directly below the inferior bony margin of the orbit, a small dry pledget of absorbent cotton intervening to prevent slipping. The upper lid is drawn away from the globe and somewhat up by an especially constructed lid elevator and supported thus by the assistant's other hand. Another assistant raises the redundant upper lid tissues out of the way and fixes it at the same time by pressure of the thumb against, or slightly above, the superior orbital margin. A specially trained assistant does this work alone.

The operator then pressed directly backward on the cornea with the point of the blunt hook at what would appear to be a point opposite the pupillary margin in these cases. This is much below the horizontal diameter. The pressure is exerted directly backward toward the optic nerve. The wound then gapes. The curved flat director is introduced at the margin of the wound with the concavity facing anteriorly. According to circumstances, the heel of the blunt hook may

be used instead of the blunt point. As soon as the lens is felt to leave its base in the hyaloid fossa of the vitreous, the blunt hook presses the cornea up in close contact with the inferior margin of the rotating lens so that it, in a measure, occupies the space left vacant by the lens. Meanwhile the director above receives the lens in its concavity and is inclined slightly forward guiding the lens outside of the globe. The action of the pressure on the cornea was demonstrated in several of the cases by a marked concavity in the corneal surface immediately following instead of the usual convexity. Loss of vitreous happened in only one case in this series.

As the lens leaves the interior of the eye it is frequently fixed on the exterior of the cornea by lateral extensions of the suspensory ligament which are still united. These are released by gentle use of the blunt hook and the lens is removed from the eye. The object of the original pressure on the cornea it seems is not so much to rupture the suspensory ligament as it is to dislocate the lens from the hyaloid fossa—the rupture of the ligament's attachments being of secondary importance.

The toilet of the wound consists of snipping off any extended bead of vitreous, and of introducing the end of the blunt hook into the angles of the wound to replace any shreds of iris. Incarceration of the iris in the angles of the wound is a complication especially to be avoided.

While in but one case of this series was there any vitreous expressed (and it was normal in consistency), two others which were known to have fluid vitreous did not suffer any loss. Fragmentation of the healthy vitreous from too much pressure after the lens had left its moorings was probably the cause—the fluid vitreous could suffer no such fragmentation and was retained by the close contact with the moving lens. It may, therefore, be reasoned that the loss of the healthy vitreous is of no great moment in these cases. With proper assistants and technic, it does not appear that this event should follow any more frequently in this than in the ordinary extraction. The retention of the weakened posterior capsule is no more protection than the close following up of the cornea on the emerging lens.

There is no postoperative irrigation of the eye and no instillation of atropin. Both eyes were closed. White's ointment was used to cover the lids. Bandage was applied to remain ten days.

In passing, the patients experienced no unusual pain or distress in any part of the operation. The iridectomies were not at all distressing to the patients.

In one case of iridectomy for glaucoma, the operator displayed unusual dexterity in the manner in which his incision was made. The point of the Graefe knife was introduced about 3 mm, above the visible edge of the cornea, the point of the blade entering the anterior chamber, and was then made to describe quickly a portion of the arc of a circle emerging with a scimitar-like sweep a short distance away in the conjunctiva without apparently having entered the anterior chamber. It was reminiscent of the manner of certain abdominal surgeons who cut down to the peritoneum with one stroke of the knife but who leave the peritoneum untouched. The incision when completed, however, was the same incision we are accustomed to see made with great deliberation and often mental anguish. The iridectomy was completed in the manner previously described.

A case of bilateral occlusion of the pupil following complications of cataract operations done elsewhere received the operator's attention, and he successfully performed an iridectomy, although not without some difficulty. His resourcefulness with a limited number of instruments was the subject of commendable comment. His therapeutics suggested the mid-Victorian era and we felt a trifle jarred at the order for ten grains of blue mass to restrain the reaction anticipated in this case. His preliminary treatment in the majority of his cataract patients is as follows: Ten grains of blue mass twenty-four hours

before operation and the night previous *eighty to one hundred grains of bromid of soda at one dose* (in solution). These suggestions were carried out to the letter in all the cases constituting the clinic.

While the operator is physically a large man and unquestionably a strong one, he was far from clumsy, and showed a familiarity with his subject that certainly was enviable. There was no shake to his hand, no uncertainty, no hesitation in the steps of his operation, and no brutality. The pressure exerted by his fingers (not by his hand or arm) was wholly in his keeping—he stopped it as he wished. Colonel Smith has also the rare faculty of inspiring his patients with perfect confidence. To be sure the personal peculiarities of his technic will arouse criticism, but here we are reminded of Abraham Lincoln's reply to the report that General Grant drank too much whiskey in which he said, "Find out the kind of whiskey and give it to the rest of the generals."

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AMERICA'S WELCOME TO OPHTHALMIC VISITORS.

We gladly cut down the space usually devoted to editorials to publish at once the special report from Dr. Fox and the correspondence of Dr. McReynolds (in a letter to Dr. Melville Black), telling of the visit of Col. Smith to this country, of the educational work he is doing, and the appreciation of his personal character and professional accomplishments shown by his American colleagues. Col. Smith is a man of strong personal character in which are many points that arouse the sympathy of American ophthalmologists. Many of the leaders in ophthalmic practice in America have taken up their work in communities of undeveloped scientific institutions and but little sympathy for or interest in ophthalmic progress. Here they have been pioneers in specialization thru superior preparation soon acquiring extended practice in which they must be prepared to meet every surgical emergency without skilled counsel and without the best assistance. These conditions are all being rapidly changed but developing under them many Americans can understand the conditions, the labors, and the satisfactions of Col. Smith's practice in India.

Other visitors from Europe are now in this country, of whose work we hope to have some account later. It will doubtless be of benefit both to the visitors and their hearers and students, altho they may not evoke the personal interest so strikingly shown in the clinics of the famous Indian surgeon. American ophthalmologists do dearly love to peer over each others shoulders and watch an operation.

Several other visitors of world wide reputation are expected to visit us this year, and it is hoped that this rising tide of old world interest in American ophthalmology will reach its flood next spring, with the assembling of the Washington Congress. However successful that meeting may be in itself we venture to predict that those

who come to it will remember the occasion, and be themselves remembered, quite as much for what they see and do in other parts of the country, as for any part in the formal proceedings of the Congress.

E. J.

PHOTOELECTRIC CURRENTS IN THE EYE.

The recent astonishing development of our conceptions as to the nature of electricity and the part played by it in the constitution and phenomena of matter, has naturally reopened interest in the biologic activities. From this point of view Sheard (Physiologic Review, 1921, I, p. 84) has submitted to critical analysis our notions as to the retinal mechanisms and reactions involved in the generation of visual sensations. "The process by which the ether disturbance causes a visual impulse may be ascribed to (a) chemical action, (b) molecular strain, (c) electrical action."

According to the chemical theory it is supposed that certain "visual substances" in the retina are decomposed by light and are reformed in darkness. The transformations of chemical energy involved in this play of katabolism and anabolism in some way excite the sensitive elements of the retina and generate visual impulses. Kühne's discovery of the photosensitive "visual purple" seemed to offer so exact a homologue of the silver salts of the photographic plate, that great strength was given to the chemical view of retinal stimulation. But the facts that visual purple is confined to the retinal rods and is absent from the cones, that it is lacking in the retinae of many animals possessing keen sight, and for other reasons, it seems certain that this pigment is but of secondary importance.

Edridge-Green, perhaps the most noteworthy contemporary investigator in the physiology of vision, is a firm proponent of the chemical theory of stimulation. He writes: "A ray of light impinging upon the retina liberates the visual purple from the rods and a photograph is formed. The rods are concerned only with the conveyance of the light impulses to the brain. The ends of the cones are stimulated thru the photochemical decomposition of the visual purple by light, and a visual impulse is set up which is conveyed thru the optic nerve fibres to the brain. The character of the stimulus and impulse differs according to the wave length of the light causing it. In the impulse itself we have the physiologic basis of the sensation of light and in the quality of the impulse the physiologic basis of the sensation of color." (The Physiology of Vision, 1920, p. 263.)

What may be called the mechanical theory of retinal stimulation depends upon the conception that the vibration amplitude of the atoms composing some visual substance of the retina is increased or decreased by the impinging light waves according to their own frequency. It may be called a resonance theory, since it postulates, in effect, increased energy of atomic vibration under the impact of light waves whose frequency is harmonic with the atomic period, sympathetic vibration. "The excursions may be so increased in extent by the rhythmic energy supplied by the light waves that the atoms will leave the parent molecules and produce new molecules."

It is supposed that the chemical energy liberated by this mechanical shaking apart of molecules is the direct source of nervous stimulation. As Sheard says: "From the viewpoint of modern science we may regard it as fairly certain that the first stage in any photochemical reaction consists in the separation of negative electrons under the influence of light. According to the theory of Grotthus, we may say that 'the action of a ray of light is analogous to that of a voltaic cell,' that is, the chemical action of light is essentially electrolytic in nature. Hence the electrical theory supposes that the visual impulse is the concomitant of an electrical impulse; that an electrical current is generated in the retina under the influence of light, and that this is transmitted to the brain thru the optic nerve."

The biologist, let alone the purely medical man, has not the training to fit him to critically weigh these physical conceptions. Recent physics presents to him

something like a midsummer madness, mingled inspiration and phantasmagoria. His reasonable attitude is that of an agnostic; to sit tight, look, listen and treat theory tenderly.

All observers agree that when the poles of a galvanometer are applied, one to the back and the other to the front of the freshly isolated eyeball, a beam of light projected thru the pupil causes a deflection in the galvanometer. Long ago Kühne and Steiner showed that this electrical variation was a property of the retina alone. The current is vital, a concomitant of life; it fails in the dead organ. Gotch found that the range of light variations within which the frog's eyeball gives definite photoelectric responses corresponds closely to the range of vision in the case of our own color sensations; that is, the photoelectric response is excited only by the luminous fraction of the spectrum. Nevertheless, a positive response is obtained when light is suddenly replaced by darkness. Different colored lights vary in their photoelectric effects in two ways, namely, in the length of the latent period of excitement and in the intensity of the current produced. The latent period of reaction is also greatly shortened by increasing the intensity of the stimulus.

Gotch infers the existence of two photochemical substances in the posterior pole of the eyeball, one of these reacts to light and the other to darkness.

Waller found no changes in the photoelectric reactions which suggested the relations of complementary color sensations; all colors produced are electric response of the same sign and direction, "more or less powerfully according as they are more or less luminous."

Summarizing the indications from many observations, Sheard concludes that, "The action of luminous stimulation upon the retina must lie without doubt in the ionization processes set up on the visual receptor cells. What these processes are or what the nature of the changes produced is still an enigma. However, ionization involves a dissociation into positively and negatively charged atoms and electrons. A stimulation by light must, therefore, set up a process of ionization whereby the positive ions may be thought of as moving in general in one direction, and the negative atoms (if such exist) and electrons as moving in opposite directions. The cerebral state corresponding with any condition of retinal stimulation consists simply in the presence in the cerebral cells of the specific ions which are liberated in the retina by the action of the light."

HENRY SEWALL.

BOOK NOTICES.

Manual of Ophthalmic Operations. F. P. Maynard, F.R.C.S. (Eng.). Lt. Col. I.M.S. (Retired), etc. Second Edition, 268 pp. 137 illustrations and 6 stereoscopic plates. Calcutta and Simla, Thacker Spink and Co. Edinburgh, E. S. Livingstone.

Of India and China with their teeming millions and inadequate development of hygiene and prophylaxis, the western surgeon thinks as a field of great opportunity to perfect his operative methods and skill. Out of the former have come the Smith-Indian operation for cataract and the Elliot trephining, that have excited wider interest and discussion among ophthalmologists than any other operative procedures proposed in the last generation.

Not a few American operators of recognized standing have traveled round the world to make themselves familiar with the technic of extraction in the capsule. It is natural that young surgeons should turn to the ripened judgment of the late Professor of Ophthalmic Surgery in the Medical College of Calcutta, for important help in choosing among the myriad ophthalmic operations proposed in the literature of today.

This work is not an encyclopedia of operations that may be done on the eye and its adnexa; but a clear concise account of those procedures that have been found most valuable in practice. More than one procedure directed to the same end may be given; but many are wisely ignored, in the interest of brevity, clearness and definiteness of teaching.

The first 75 pages deal with such general matters as: Preparation of the Patient, Surgeon and Assistants, Operation

Room, Instruments, Dressings, etc., and General and Local Anesthesia. Under the latter we notice a tabular comparison of eight local anesthetics and adrenalin, as to their mode of action, mode of use, advantages and disadvantages, that must be very helpful to the young surgeon in getting the leading facts of this subject clearly arranged and firmly grasped. The type error, omitting H from holocain, is a little puzzling at first glance, suggesting that among the numerous drugs put forth as anesthetics is one that had not before been heard of.

Chapter IV takes up special operations, Iridectomy, Iridotomy, Anterior and Posterior Sclerotomy and Sclerectomy. Chapters V to VIII inclusive, 57 pages deal with operations on the Lens. After that come single chapters, each for Operations on the Conjunctiva, Cornea and Lids, the Lacrimal Apparatus, Removal of Foreign Bodies, Enucleation and Its Substitutes, Operations on the Orbit, and Squint Operations.

The descriptions here given are not clouded with unnecessary words; but with the help of the illustrations will be found clear and most helpful to the novice. Yet the widely read ophthalmic surgeon will find much to ponder, both regarding what is here included and what is omitted, that will help to throw light on his choice of methods. In general make up, the work corresponds closely to that of the "Manual of Ophthalmic Practice" by the same author, which we recently noticed (v. 4, p. 57). This second edition comes after an interval of several years since the first edition was exhausted. The great war was responsible for this interval, and in this edition we have some references to facts learned during that period of unexampled activity. E. J.

Augenärzliche Eingriffe. Ein kurzes Handbuch für angehende Augenärzte. Von Professor Dr. J. Meller, Wien. Zweite Auflage. 460 pages, 219 illustrations, 1 plate. Vienna and Leipsic, Josef Safar, 1921.

Meller's Ophthalmic Surgery is well known and popular in America where the translation by William E. Sweet, which was called a "Second Edition," was published in 1912. This edition, bearing the date 1921, shows still futher revision and some important additions to the text while the number of figures used to illustrate the text has been increased by 46.

Among the most important additions is the one describing the Krœnlein method of resecting the orbital wall. This occupies 9 pages and is illustrated by 8 figures. It is followed by a description of the operation of L. Müller for relief of choking of the disc. In the accounts here given of orbital operations, and of others, we find a more detailed account of the methods of producing local anesthesia by nerve block, than usually accompanies descriptions of ophthalmic operations.

Chapter XV, dealing with the extraction of foreign bodies from the interior of the eye, has been considerably developed, and now occupies 19 pages. More than any other, perhaps, it shows the lessons learned during the Great War regarding the treatment of war wounds. The account of tonometry has been extended in recognition of its increased importance as an indication for the various operations for the control of ocular hypertension.

The concluding chapter on minor ophthalmic operations continues to be a valuable feature of this book. In it are considered such procedures as exposure of the conjunctiva of the upper lid by turning over Grönholm's spoon, hypodermic injections, the operative treatment of pterygium, trachoma, and chalazion and the duties of the assistant in ophthalmic operations. These are things that bulk large in the work of the young ophthalmic surgeon.

The book is still one that will be most helpful to the young operator who is developing his own technic. It puts at his service the best of standard methods without confusing him by reference to suggestions of less importance or unproven value. E. J.

Nursing in Eye, Ear, Nose and Throat Diseases. Second Revised Edition, by **A. Edward Davis,** A.M., M.D., and **Beaman Douglass,** M.D.

Some years ago we gave a favorable review to this book and again extend our commendations. It has been written primarily for the use of nurses, but students and general practitioners will, we believe, find it of great assistance to them also. It is not a treatise in any sense of the word, but is meant simply as a guide for the intelligent care and nursing of the various diseases of the eye, ear, nose and throat, and to instruct the nurse as to her exact duties during and following operations upon these organs.

Antisepsis and asepsis have received particular attention, since, above all, the nurse should know the all-importance of surgical cleanliness. The methods of preparing the numerous antiseptic and sterile solutions and dressings have been given in detail, while the various remedies required in the treatment and nursing of these special organs, their preparation, sterilization and exact method of application have been considered fully and most carefully. In fact, we have endeavored to show the nurse how to do things and correctly, because, in treating such delicate organs as the eye, ear, nose and throat, the good results obtained depend fully as much upon the intelligent and painstaking care of the nurse as upon the work of the physician himself.

A brief outline of the anatomy and physiology of the eye, ear, nose and throat has been given in order that the nurse might better understand the subjects under consideration.

Dr. Davis has written the chapters on the eye; Dr. Douglass those on the nose, throat and ear.

In the second edition of this little volume every chapter has been carefully revised, new matter incorporated and an entirely new chapter on Vaccine and Serum Treatment added.

This book will be of material assistance to special surgeons in training nurses, as well as to those who are studying the special procedures necessary for nursing. It is well printed, bound in linen and illustrated where necessary. H. V. W.

CORRESPONDENCE.

Col. Henry Smith at Dallas.

Dear Doctor Black

I have just received your note of regrets and you do not know how very much we would have enjoyed having you with us on the occasion of the Colonel's visit. We really had a wonderfully successful clinic at which, perhaps, as many ophthalmologists were in actual attendance as have ever attended any ophthalmologic clinic in this country. Colonel Smith and Dr. Fisher thought it was the largest attendance of ophthalmologists they had seen at any clinic. We had twenty-two operations, embracing a variety of conditions. The operations were mainly for senile cataract, congenital cataract, aftercataract, lowering of updrawn pupils and glaucoma. You will be glad to know that his patients are getting along beautifully and are having, as a general rule, no reaction whatever.

I had a great deal of difficulty in arranging for the Dallas Meeting because of the fact that the Colonel's address before the New York Academy of Medicine followed so closely upon his engagements in Ohio that it hardly gave us time to insert the Dallas engagement. I then went to Washington, took up the matter with General Ireland, and the Air Service, with the result that the War Department very cheerfully agreed to place at Col. Smith's disposal a De Haviland plane in order that he might make the trip from Cincinnati to Dallas and back in time to fill his New York appointment. However, the Ohio men agreed, later, to shorten their program so as to enable Col. Smith to visit Dallas by rail.

I went to Columbus to see his clinic there, which was the largest with regard to operations that he has so far held. There were about fifty-five cataract extractions altogether at Columbus. I then went with him to Dayton where we had a very excellent meeting and about twenty-five operations.

We then went down into Kentucky, Clarence King, Vail and a few others, where we were joined by Drs. J. A. Stucky and Will Stucky and Dr. W. M. Offutt who took charge of us for a two days tour thru the Bluegrass region of

Kentucky. We visited a large number of the most important stock farms in the Bluegrass and saw many wonderful animals, from Man-of-War down. You would have been astonished to observe the very intimate knowledge which Col. Smith has of all kinds of live stock, and the managers of those various stock farms were delighted to discuss with him the fine points of interest in connection with the science and art of Animal Husbandry. They gave us a wonderful time in Kentucky, and then we returned to Cincinnati for the clinic on Monday, the 9th, which was very delightful in every way. We had there about twenty cataract operations. That night we had an address before the Cincinnati Academy of Medicine, and the following morning we had a breakfast at the Sinton Hotel where a number of local oculists were present to bid us *bon voyage*. We took the train at eight o'clock over the B. & O. for St. Louis, where John Green and Hardy, and others, met us at the station. After a minute's chat, we took the train for Dallas, arriving on the afternoon of the 11th. Col. Smith and Dr. Fisher were guests in my home while they were here, and they were presented at the President's reception of the Texas State Medical Association on the evening of the 11th. We had about a thousand members of the State Association here.

On the morning of the 12th we had our ophthalmologic clinic at St. Paul's Sanitarium extending from nine o'clock till two, and in the afternoon we had a symposium on cataract, Col. Smith reading his oration on "Intracapsular Cataract," while Dr. Fisher followed with a paper on "The Accidents to be Avoided in the Intracapsular Cataract Operation," and your humble servant closed with a review of "The Status of Intracapsular Cataract Operations in North America with an Analysis of the Procedure and the Results."

The following morning we made some more operations at St. Paul's Sanitarium and then the Colonel and Dr. Fisher left on the afternoon train.

It might interest you to know that large sums of money have been offered the Colonel as compensation for his operations, but he has positively refused to accept a dollar, saying that he does not intend to return to Europe with his pockets filled with American gold, that his purpose is to bring before the ophthalmologists of America what he considers some important truths in Ophthalmic Surgery.

JNO. O. MCREYNOLDS.

The Colorado Congress

To the Editor: The Colorado Congress of Ophthalmology and Oto-Laryngology will meet in Denver, Colorado, July 29-30, 1921. As usual all ophthalmologists who find it convenient to take these days as part of their vacation in Colorado will be welcome.

The preceding days of the week, July 25-28 inclusive, will be filled with a special series of lectures and demonstrations of the Summer Course in Ophthalmology, given in the University of Colorado at Denver. These will be open to those attending the Congress.

Those who will undertake to present papers at this meeting of the Congress may communicate with Dr. William C. Finnoff, 318 Majestic Building, Denver, Colorado.

BIOGRAPHIC SKETCH

GEORGE THOMAS STEVENS, M.D., Ph.D.

Dr. George Thomas Stevens was the son of Rev. Chauncey Coe Stevens and Lucinda Hoadley Stevens. He was born in Jay, Essex county, New York, on July 25, 1832, and died at his residence, 350 West 88th street, New York City, on January 30, 1921.

His childhood and early youth were spent in Elizabethtown and Crownpoint, New York, where his father was a Congregational minister. He received his early education in the schools of the county and thru studies with his father, who was a man of high literary attainments.

He received his medical education at the Castleton, Vermont, Medical College where he graduated in medicine in 1857. He commenced the practice of medicine in Wadhams Mills, Essex county, New York. On April 17, 1861, he married Harriet Weeks Wadhams of Wadhams

Mills, New York. Their children are Frances Virginia Stevens, who married Prof. George Trumbull Ladd of Yale University; Dr. Charles Wadhams Stevens, who married Marion Duncan Paine, now practicing ophthalmology in New York City; and Georgina Wadhams Stevens, who died in childhood.

At the outbreak of the Civil War in 1861 he was commissioned an Assistant Surgeon in the 77th Regiment, New York State Volunteers. He was later made Surgeon and for two and one half years was operating surgeon of his Division. He served in all the campaigns of the Army of the Potomac and for a time was Medical Inspector of the Sixth Corps.

At the close of the war he resumed the general practice of medicine in Albany, New York, and in 1870 was appointed Professor of Physiology and Diseases of the Eye in the Albany Medical College, the Medical Department of Union University. In 1877 he was given the honorary degree of Doctor of Philosophy by Union.

Being desirous of confining his work solely to ophthalmology, he removed to New York City in 1880. He continued in active practice up to the time of his last illness, about two years before his death, and retained his steadiness of hand and ability to perform delicate eye surgery into his eighty-sixth year.

His published works include: "Three Years in the Sixth Corps," 1866; "Flora of the Adirondacks," 1868; "Les Maladies des Centres Nerveux," 1883; "Functional Nervous Diseases," 1884; "Coaching thru North Wales," 1895; "Les Muscles Moteurs de l'Oeil et l'Expression du Visage," 1892; "A Treatise on the Motor Apparatus of the Eyes," 1905; "An Illustrated Guide to Flowering Plants," 1910; "A Series of Studies of Nervous Affections," 1911; as well as numerous articles on ophthalmologic and general science topics.

In 1883 he received the highest award in a competition instituted by the Royal Academy of Medicine of Belgium for an essay on "Functional Nervous Diseases."

He was five feet and five inches in height and weighed about one hundred and thirty-five pounds. He wore a mustache. His complexion was florid, his eyes dark blue and his hair dark brown.

He was a lover of good books and had a large general library. He was also an ardent student not only of all branches of his profession, but also of natural history in all its forms. His principal recreation was the study of botany. His extensive herbarium included plants and flowers from all parts of America and Europe. His Guide to Flowering Plants, mentioned above, was published in his eightieth year. It was illustrated with hundreds of drawings made by him from nature.

His attitude toward his professional brothers was an extremely friendly one as evidenced by a host of warm professional friends from all parts of the world. He was very fond of children and also of animals.

In politics he was a republican and was always interested in current events. He was a member of the Congregational Church.

Dr. Stevens's principal contribution to medical science has been his investigations and writings with reference to the anomalies of the ocular muscles. The terminology which he introduced has been universally accepted, and his instruments for determining anomalous muscular conditions are standard and distinctly original.

A list of these terms and instruments is herewith appended.

TERMS RELATING TO CONDITIONS OF OCULAR ADJUSTMENTS.

This system of terms was formally approved and adopted by the American Medical Association and is in general use in America and Europe.

Orthophoria (ορθοσ, right; φορα, a tending).—A tending of the visual lines in parallelism.

Heterophoria (ετεροσ, different).—A tending of the visual lines in some other way than in parallelism, but notwithstanding which, parallelism is habitually maintained by muscular effort.

Esophoria.—A tending of the visual lines toward each other, the tending being restrained so as to permit habitual binocular vision.

Exophoria.—A tending of the visual lines outward, a restraining influence being exerted to maintain parallelism.

Hyperphoria.—A tending of one visual line to rise above its fellow, a tending habitually restrained by muscular action. The term is usually preceded by the word *right* or *left,* indicating which visual line tends above.

Heterotropia (τροπη, a turning).—A generic term indicating a deviation of the visual lines from parallelism. A condition of strabismus.

Esotropia.—The deviation of the visual lines inward. Converging strabismus.

Exotropia.—The deviation of the visual lines outward. Diverging strabismus.

Hypertropia.—The deviation of one visual line above the other. Vertical strabismus.

Anophoria.—The tending of both visual lines toward a plane above the horizon when the head is in what is known as "the primary position."

Katophoria.—A tending of both visual lines toward a plane below the horizon, the head being in the primary position.

Declination.—A leaning of the vertical meridian of the eye to the right or to the left of a true vertical position.

INSTRUMENTS DEVISED BY DR. STEVENS.

These instruments have been widely used and have not been superceded for the purposes for which they were devised.

Phorometer.—An instrument for determining the relations of the visual lines to each other.

Tropometer.—An instrument for determining the rotations of the eyes.

Clinoscope.—An instrument for determining the directions of the meridians of the eye.

In addition Dr. Stevens devised a complete set of surgical instruments for the performance of surgical operations on the external muscles of the eyes.

CHARLES W. STEVENS.

ABSTRACTS

Mazzei. Relations Between Intraocular Tension and Arterial, Venous and Intrathoracic Pressure. Arch. di Ottal., v. 27, p. 83.

By a special recording device, the author was able to record the intraocular tension simultaneously either with the carotid blood pressure, the jugular blood pressure or the endothoracic air pressure. The marked rise of arterial pressure produced by adrenalin and also the marked fall in pressure produced by sodium nitrit were reflected by a similar rise and fall in the intraocular tension.

Smaller changes in the arterial pressure, however, due to struggling or quickened action of the heart were not reflected in the intraocular tension. Changes in the jugular pressure produced by struggling were always accompanied by a similar rise in intraocular tension. This was true of changes in thoracic pressure, probably due to the effect of positive or negative pressure in the chest on the large veins in the neck.

The author also found that tying off both superficial jugular veins raised the intraocular tension two to three millimeters; and tying off both superficial and one deep jugular raised the intraocular tension five millimeters. Tying off one deep carotid artery lowered the tension about three millimeters.

The author concludes that there is a definite relation between the blood vascular system and the intraocular fluids, which is shown especially by the relation between venous pressure and intraocular tension. This intimate relation he believes is due to the effect of venous congestion in filling the venae vorticosae with blood and hence raising the tension. The practical deduction from this is that in treating high intraocular tension all obstacles to the venous circulation must be removed and anything which increases intrathoracic pressure must be avoided. The literature is discussed and a bibliography of sixteen titles is appended.

S. R. G.

Junius. Hereditary and Acquired Myopia, Zeitschr. f. Aug. XLIV, 5-6.

The questions of the causes, and of what is short-sightedness, are taken up by this author in an essay of 40 pages, with an extensive bibliography. Neither the theory that myopia is caused by lessened nourishment of the tissues; nor the explanation of Stilling, that it is developed by the pull of the external muscles in different forms of the orbit; nor the theory of Steiger, that short-sightedness is a personal acquirement due to inheritance, are fully acceptable.

Short-sightedness is not a personal characteristic, but is a development from forbears. All of these theories have some points worthy of consideration. The latest anatomic studies show that preexisting structural changes must occur for myopia to be developed, which give cause to secondary elongation of the eyeball. The development of the eye has not explained the myopic process. Short-sighted eyes generally show some of the following signs and conditions:

1. Early loss of sensitiveness for light, with slow adaptation and with hemeralopia in a portion of the cases. The development of hemeralopia in myopia is probably due to the disintegrating effect of ultraviolet light rays, where the lens allows these rays to penetrate. It is not, however, generally considered as a cause. In general, there may be a coincident dislocation of the lens and anomalies of the retina, developmental signs connected with hemeralopia, but the acquired weakness of the structures only exists in the high grades.

2. The thinning of the otherwise well developed sclera, which occurs only at the posterior pole, may be observed in the lowest grades of myopia. Steiger states that myopic refraction can arise from misplaced axes with unsuited corneae, which are refractory to the normal development of the ocular structures. By struggle of the growing eye the final shape and its functional capacity are developed. We must agree with Roux that the thinning and lessened resistance of the sclera in the posterior pole allows of the optic axis becoming longer and is the first noticeable acquired change in the eye.

3. Hereditary and developmental changes are always combined in myopia. The development of ectasia is in the postretinal layers in the epithelial buds, and the anatomic deviation proceeds to the pars ciliaris retinae. No final explanations have been given as to the cause of conus and staphyloma and of the retinal detachment, which is of much importance in the question of myopia.

Many think that short-sightedness is caused by a tendency toward it in the growth of the eye, which is not directly, congenitally abnormal (Steiger), but is in a general sense an acquired anomaly. Myopia may become worse in each individual. The congenital tendency and acquired changes are often inseparable in any case of myopia. Many socalled malignant forms of myopia in young people may be so explained, in that strong tendencies to changes in form are to be observed and perhaps there are also unseen tissue changes in the structure. It is considered that the individual with short-sightedness is disposed towards it by descent. Steiger was not cognizant of the newer biology, as he wrote in 1913. The germ cell has a certain sensitive period in which it responds to influences from its forbears, and thus direct inheritance of myopia from the parents is not impossible. We draw the boundary line between the developmental period and the time in which changes may be acquired, at the end of fetal life, the moment of birth making a sharp line of demarcation (Roux).

5. All variations of the developmental momentum, whether positive or negative, are factors in the myopic process. Light causes physical and chemical irritation to the retina, affects its growth and functions. In the production of myopia the light rays of the spectrum are of first importance. Ultraviolet light has little to do with myopia, but much with hemeralopia. The noteworthy cases of the hemeralopic

short-sighted family, described by Pflueger, give a place to the supposition that ultraviolet light affects the dark apparatus (Parinaud, v. Kries), i.e., the rods and their accessories by electric damage; while the light rays affect the light apparatus, i. e., the cones. The retina is sensitized by light which, from our knowledge of the life of cells, affects the proteins, the colloid substances and their functions, and also sensitize the salts which are held in solution in their substances. Physiology has shown that there is a damaging electric effect upon the cells. The preeminence of the foregoing factors needs further proof, especially the effect of light upon the lens and retina.

H. V. W.

Wertheim Salomonson, J. K. A. Binasal Hemianopsia. Tydschr. v. Geneesk, Dec. 6, 1919.

At a meeting of the Amsterdam Neurologic Society Prof. Salomonson presented a man, 59 years old, with complaints of poor vision and bad hearing. He had fallen in 1895 in the hold of a ship, bled from nose, mouth and ears and remained unconscious for some time. He suffered permanent impairment of hearing of the right ear, and divergent strabismus. The double image disappeared; the hearing became worse. During 13 years he did light work. During the last 18 months his vision diminished gradually, without apparent cause. A cloud was before his eyes, which existed chiefly in the middle of the visual field. He can now see from the side not straight ahead. A few months ago headaches appeared at irregular times, and without apparent cause. No hereditary predisposition and no scars were found. L. remains in abduction; its palpebral fissure is narrowed. Only slight abduction and motion downward with marked rotation is possible. The entire oculomotor nerve is paralyzed. The left facial nerve is slightly paretic. Vision has slightly diminished. A distinct binasal hemianopsia is present, which leaves for R. the fixation point free, while in L. the fixation point is in the defect and only eccentric fixation is possible. Hearing at the left is lost, at the right diminished; the left vestibular nerve is insensible for caloric stimuli. After turning and caloric stimulation some nystagmus is produced from the right vestibule. Deep reflexes in the legs are very weak or absent; knee jerks very weak. At present only 26 cases of binasal hemianopsia have been described. K. H. Bouman could demonstrate in 1909 in a patient of Straub's clinic that the binasal hemianopsia was produced by pressure from above and behind the chiasm, which damaged both the uncrossed bundles the most. This happens because the uncrossed bundles pass at the outer side of the chiasm, but enclosed in the other fibers, and only come more at the surface at the posterior part of the chiasm. In this case a marked narrowing of the temporal side of the visual field was at the same time present. This explanation also holds good for the cases of cerebral tumor and even more for hypophysis tumor. It is difficult to explain thus the traumatic cases (Tuffier, Friedenberg) the cases comformable with that of Struempell, where an isolated neuritis was found, restricted to the direct fibers; the true luetic cases (Galezowski) and the cases where the symptoms of tabes dorsalis are found (Roenne, Price and Head). The possibility of direct side pressure thru arteriosclerosis on the outer sides of the chiasm must be thought of (Knapp).

As the binasal hemianopsia appeared since the last 18 months the old basic fracture, which destroyed the left eighth nerve and facial, cannot be the cause. Roentgenography shows a large sella turcica, but there do not exist typical symptoms of a hypophysis tumor; and W. S. has seen repeatedly cases where the hypophysis was undoubtedly normal and the sella turcica of about the same size. The thinning of the bone, which is present with pathologic enlargement, here is absent. A frontal roentgenograph shows distinct important changes, namely a distinct general darkening directly at the left, beside the sella. It is impossible to make out the cause of this shadow.

Wertheim Salomonson hesitates to diagnose tabes. The absence of the Achilles reflexes and the weak knee jerks are repeatedly found with other persons and belong to the not rare cases of old age neuritis and some cases of medullary arteriosclerosis. Arteriosclerosis is present in a not insignificant degree, so that the possibility of a bilateral carotid sclerosis with eventual aneurysmal dilatation is possible; but it is not proven.

It is impossible to make a certain diagnosis. Important are 1, the previous trauma, which could be the cause for a tumor or aneurysm; 2, the X-ray findings, which point with certainty to a probable tumor or skull deformation in the neighborhood of the sella turcica; 3, the binasal hemianopsia without temporal narrowing. This points rather at double-sided pressure on the chiasm. E. E. B.

Magitot. Traumatic Myopia. Ann. d'Ocul. v. 157, 1920, p. 680-692.

1. Low degree of myopia, of short duration, disappearing without treatment. There was a hypotension which disappeared with the decrease in the spasm of accommodation. The pupil, at first normal, after 3 days showed a slight spasm, which lasted 25 days.

2. A case of ocular contusion with slight hyphema. Irregular pupil and decreased tension. A myopia of 2 D, decreasing to 1 D in 9 days, finally spontaneously disappearing, with increase and decrease of amount at various times.

3. Contusion of the eye with decrease of tension and spasm of accommodation causing an apparent myopia. This would disappear when atropin was used, to reappear on stopping the atropin. Inequality of the pupil. Finally disappearance of the myopia, but persistence of slight decrease in size of pupil on affected side.

4. Ocular contusion with slight hyphema and ophthalmolacia. Spasm of accommodation with no tendency to remission and very resistant to atropin, unaffected by general anesthesia or paracentesis. C. L.

Nakamura, B. Change of Color of the Human Fundus in Progressive Dark Adaptation. Klin. M. f. Augenh. v. 65, 1920, p. 83.

In 1907 Oguchi described in a patient with stationary hemeralopia a whitish back-ground with very marked reflexes and much darker retinal vessels. Several such cases of Oguchi's disease of undoubtedly family occurrence in Japan have been published. Nakamura observed with Mizuo in a patient affected with this disease that the peculiar ophthalmoscopic condition entirely disappeared after closure of the eye for hours with exclusion of all light, and a simultaneous improvement of the light sense.

He constructed an adaptometer with which he studied the exact progress of dark adaptation. This remained at first stationary, but after from 1½ to 2½ hours suddenly progressed. The subsequent ophthalmoscopic examination showed the background normal which during the stationary period had a peculiar appearance. After 9 hours dark adaptation the relative light sensibility was 204,000 with normal fundus. Then a subcutaneous injection of 1 c cm. adrenalin 1:1000 was made. An hour later the light sensibility fell to 11,000 and the fundus appeared slightly yellowish with dark vessels. After repeated dark adaptation for three years the former normal state was restored. The phenomenon seemed to have a certain relation to the change of color of the retina of a dark adapted frog after injection of adrenalin. C. Z.

Kubik, J. Cysts of the Lacrimal Sac. Klin. M. f. Augenh. v. 64, March-April, 1920, p. 264.

K. observed in a girl, aged 21, who complained of lacrimation of the left eye, a small bluish tumor at the region of the tear sac, which could not be evacuated by pressure while the tear sac could be irrigated. At the operation, according to Toti, a cyst, filled with serum, was found at the anterior wall of the tear sac, and extirpated. K. discusses the literature on the origin of cysts of the lacrimal region and concludes with the assumption, that they, on the one hand, originate in the glands of the wall of the

tear sac and the diverticles formed by inflammatory process (Lurie), on the other hand, that various anomalies in the structure of the lacrimal sac as remnants of embryologic conditions of development are responsible for their formation.

Bailliart, P. Knowledge Concerning Retinal Arterial Pressure. Ann. d'Ocul. v. 157, 1920, p. 308.

The author reviews the objections which his previous papers had evoked and claims they are not well grounded. The apparatus used is sufficiently exact and the technic is not as difficult as claimed. Direct ophthalmoscopy is to be preferred to indirect, as the latter does not give sufficient magnification. The apparatus should be applied directly to the conjunctiva, after the use of holocain. Homatropin should not be used except in myosis or lesions of the media. The author has worked out a table which gives the correspondence between the initial tension most frequently found and the dynamometric pressure, but even this is not exact. Measurements made on the eye of the cat are not exact for the human eye, but they are close enough. Objections to the views and results of several authors are given. In conclusion, he states that while ocular tension is not influenced by retinal arterial pressure, there is a parallelism between the two within certain limits, and quotes the findings of Velter as proof. C. L.

Giraud, P. Transitory Amaurosis with a Small Yellow Spot Above the Macula Following the Ingestion of Quinin. Clinique Ophtalmologique, v. 25, 1921, p. 237.

The author reports the case of a young woman who took 6 grams of quinin with criminal intent. Its use was followed by vomiting, anuria and contraction of the field of vision. The optic nerves were blanched and the retinal vessels greatly contracted with an associated periarteritis.

The unusual feature was the yellow spot a little above the macula. He calls attention to the observation of Zanotti who noted disseminated white spots along the retinal arteries. Zanotti explains the existence of these spots as a degeneration of the retina due to the ischemia.

T. J. D.

Addario, La Ferla. Retinitis Proliferans Due to Trauma. Arch. di Ottal. v. 27, p. 105.

The author had the opportunity of observing a typical case immediately after the trauma and two years later. The case was in a young soldier who, after the explosion of a hand grenade in his vicinity, had noticed disturbances of vision and that objects seemed red. At this time, both eyes showed hemorrhages in the retina and vitreous so extensive that in the right eye, the fundus could not be seen. On diaphoretic treatment, darkened room and subconjunctival injections of adrenalin, vision improved to one half in both eyes, when the patient was dismissed. On his return two years later, the typical changes of retinitis proliferans were seen. Numerous white bands extended from the retina near the disc to other points toward the periphery of the retina. Most of these were on the surface of the retina, passing in front of the retinal vessels. Some ended by a club shaped enlargment which floated freely in the vitreous. Others spread out into a thin membrane in the periphery of the retina. His fields were markedly cut down in both eyes. In this case, lues, nephritis, diabetes, hemophilia and malaria could all be excluded as causes, the traumatism being the only possible cause. After a review of the literature, the author believes that intraocular hemorrhage, usually from trauma is probably always necessary to the production of the fibrinous bands which make up the picture of retinitis proliferans.

S. R. G.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orelans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo. Volunteers are needed in other localities.

DEATHS.

Daniel E. Esterly, Topeka, Kansas, aged fifty-four, died May eighth.

Charles C. Stuart of Cleveland died April 11th, aged fifty-four. He was ophthalmologist to German, City, and Charity hospitals.

Charles H. McIlwaine, Newark, New Jersey, aged seventy-seven, founder and for ten years director of the Trenton Eye and Ear Infirmary, died April twenty-first from uremia.

Ernest Schalck, Brooklyn, aged sixty-one, died April fifteenth from heart disease. He was ophthalmologist to Wychoff Heights Hospital and Bethany Deaconess Home and Hospital; surgeon to Knapp Memorial Hospital.

Henry E. Juler, F.R.C.S., Moorfields' Eye Hospital, London, died at his home, 17 Alexander Court, Queen's Gate, London, April twenty-third, at the age of seventy-nine. He was for many years ophthalmic surgeon, Royal Westminster Hospital, St. Mary's Hospital and clinical assistant Royal London Ophthalmic Hospital, Moorfields.

PERSONALS.

Dr. Alfred Murray of Chicago has been appointed Rhinologist and Laryngologist to the Augustana Hospital.

Dr. Isaac Hartshorne announces the removal of his office to 30 West 59th St., New York City.

Dr. Pacheco Luna of Guatemala, and Dr. A. S. Green, of San Francisco have been visiting the various clinics in France, Spain and Vienna.

Dr. Edward Jackson of Denver attended the meeting of the Iowa State Medical Society, and addressed the Society on the topic "Diseases of the Blood Vessels as seen in the Eye."

Dr. William M. Gordon Byers has been chosen Surgeon-in-Charge of the Ophthalmic Department of the Royal Victorial Hospitals and Clinical Professor of Ophthalmology in McGill University, Montreal, Canada.

Dr. Edward Jackson and Dr. William C. Finnoff, of Denver, have gone east to attend the meeting of the Section on Ophthalmology of the American Medical Association and the American Ophthalmological Society.

NEWS ITEMS

Dr. George F. Keiper of La Fayette, Indiana, has been elected president of the new Indiana Hospital Association, formed April 27th at La Fayette. The association is auxiliary to the American Hospital Association.

Dr. Frederick W. Lamb, of Cincinnati, announces that after twenty years' association, his partnership with Dr. Derrick T. Vail has been dissolved, and that he has opened offices in the Provident Bank Building, at Seventh and Vine Streets, Cincinnati, Ohio.

Dr. George E. de Schweinitz has been chosen President elect of the American Medical Association. No candidate appeared against him when the elections came up in the House of Delegates. The next meeting of the Association will be held in St. Louis.

Dr. James A. Spalding, a veteran ophthalmologist of Portland, Me., has recently had the misfortune to lose his aged wife. The affection seems to have been a tumor of the pituitary body. The ophthalmologic profession extend their sincerest sympathy to Dr. Spalding at this time.

Col. Henry Smith, I.M.S., Punjab, India, addressed the Cincinnati Academy, May 9th; the Texas State Society, at Dallas, May 12th, where he held a clinic May 13th on Intracapsular Extraction. The Illinois Medical Society, May 16th, and the Pittsburgh Medical Society, May 23rd. He will attend the session of the American Medical Association, Boston, and the American Ophthalmological Society, at Swampscott, June 15th.

SOCIETIES.

At the regular meeting of the Chicago Ophthalmological Society May 26th, a dinner preceding the meeting was given in honor of Lt.-Col. Henry Smith. On the same afternoon Col. Smith conducted a surgical clinic at the Illinois Charitable Eye and Ear Infirmary.

Dr. C. R. Dufour, of Washington, D. C., read a paper on "The Consideration of Certain Eye Diseases with which the General Practitioner should be Acquainted," before the regular meeting of the Warren, Page, Rappahannock Medical Society, Front Royal, Virginia, April 12, 1921.

At the May 16th meeting of the Section on Ophthalmology of the New York Academy of Medicine the essayists, by invitation, were Lt.-Col. Henry Smith and Dr. Harry Vanderbilt Würdemann. The paper of Col. Smith was upon "Some Ophthalmic Conditions," which embraced a short note on microphthalmos and congenital cataract, the control of the eyelids in cataract operations, and how to deal with a drawn up pupil. Dr. Würdemann presented a paper on "The Mechanism and Effect of Massage of the Eyeball as Applied in Iritis, Synechia, Glaucoma, Embolism of the Central Artery, Optic Nerve Atrophy and Retinitis Pigmentosa.

The American Ophthalmological Society held its meeting at Swampscott, June 14th and 15th with nearly one hundred members present and a large number of visitors. The limit for membership was raised from two hundred to two hundred and twenty-five. The following were elected associates and upon attendance of the required number of meetings will become full members of the Society: William L. Benedict, Rochester, Minn.; Nelson Miles Black, Milwaukee, Wisconsin; E. E. Holt, Jr., Portland, Me. The next meeting of the Society will be held in Washington, D. C., in association with the Triennial Congress of American Physicians and Surgeons.

MISCELLANEOUS.

During his visit to Dallas, Texas, Lt.-Col. Henry Smith, of India, was presented with a handsome gold watch and chain by Dr. J. O. McReynolds.

Thru the efforts of Mrs. Beatrice Duncomb, of London, president of the Guild of Blind Gardners, it is hoped to secure a piece of land near London on which to establish a training center for the blind to obtain a useful occupation.

Oklahoma has passed laws creating separate boards for chiropractors and osteopaths, which allows them to administer any drugs taught in their schools and requires the instillation of one per cent silver solution in the eyes of new-born infants. Such laws give these cults a great boost at the expense of the public. We wonder how long the public will stand for it.

Several cases of ophthalmia neonatorum treated by Chicago physicians, which terminated in blindness, were investigated by the Illinois Society for the Prevention of Blindness and it was learned that in six cases the physicians failed to observe the requirements of the State law governing the report of physicians. This law requires a report within six hours of any inflammation in the eyes of an infant under two weeks, irrespective of the nature of the infection.